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JUNE 22 1957
VOL. 152 - NO. 25

Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY

SOLAR RADIO HELMET

Rows of tiny solar batteries in the crown provide all the electricity needed for this sun-powered version of the Army's helmet-radio. Nickel cadmium storage batteries supply peak current and night power. Developed by Signal Corps. Story on page 44.

MANAGEMENT • PLANT • TRAFFIC • COMMERCIAL • LEGAL • ACCOUNTING

1953

1954

1955

1956

1957

"There is Nothing Fine

Four years ago,

Stromberg-Carlson began manufacturing a "500" type telephone instrument completely in accord with Bell System standards of transmission quality.

Now that others are following suit,

we find it advisable to remind interested companies that we were first.

ne han a Stromberg-Carlson"

S-C STROMBERG-CARLSON

FLASHES AND PLUGS

WHERE'D WE BE WITHOUT KIDS? In its continuing campaign to help parents develop in their children proper respect for the telephone, Illinois Bell Telephone Co. supplied the anecdotes which we quote below from an article appearing in the Chicago Sun-Times:

"It's calling a strange household and getting an unknown child on the wire that can often lead nowhere . . .

"One man, the father of two, advocates the suspense technique for keeping little folks on the line. When a child asks, 'Who are you?' he thinks fast and says something intriguing, like: 'I'm the jelly bean man. What color jelly beans do you like best, sweetheart?'

"Another young father we know disapproves of this approach. He thinks much of the mischief is caused by playful adult callers . . .

"Goodnaturedly, the telephone company realizes that a ringing telephone is irresistible to most toddlers. And if the baby doesn't quite know how to cope with a disembodied voice coming over the wire, it's understandable.

"Illinois Bell also approves of toy telephones, on the theory that children can practice correct procedure on them with less temptation to take the real telephone off the hook.

"In the company's files are numerous case histories of small children who have calmly turned to the friendly telephone for help in emergencies. One concerns a 4-year-old who was asked if she had ever used the telephone.

"She nodded and said: 'It was when somebody tried to get in the window.'

" 'Did you call the operator?' she was asked.

" 'Yes,' was the reply. 'And she got the policeman!'

" 'And they caught the burglar?'

" 'Yes!' beamed the little girl. 'It was Daddy!' "

•

ERROR, KING SIZE. The telephone company's new dial-it-yourself long distance system has possibilities of some really magnificent wrong numbers, points out the *Milwaukee Journal*.

A Kenosha housewife answered her telephone the other day and a voice asked, "Is this Olympia 2-4286?" She replied that it was.

"You don't sound right," the caller said. Where are you?"

"Right here in Kenosha."

"Where's Kenosha?"

"Wisconsin."

There was a gasp at the other end of the line.

"I'm in Los Angeles trying to get my mother in Oakland," the caller said. "Guess I dialed the wrong Olympia."

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Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY
Since 1901

JUNE 22, 1957

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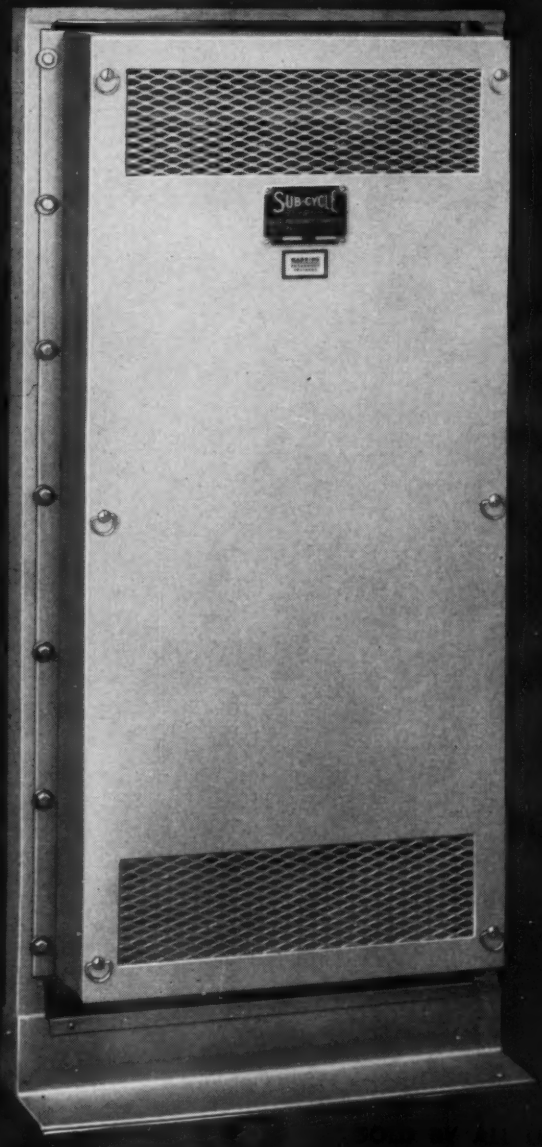

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The Model S-5 can be equipped to supply either 25 cycles or 20 cycles as the first frequency. If only four frequencies are required, the second is designated as a "Spare." A complete unit takes up space only 2'-1/2" sq. by 3'-1" high.

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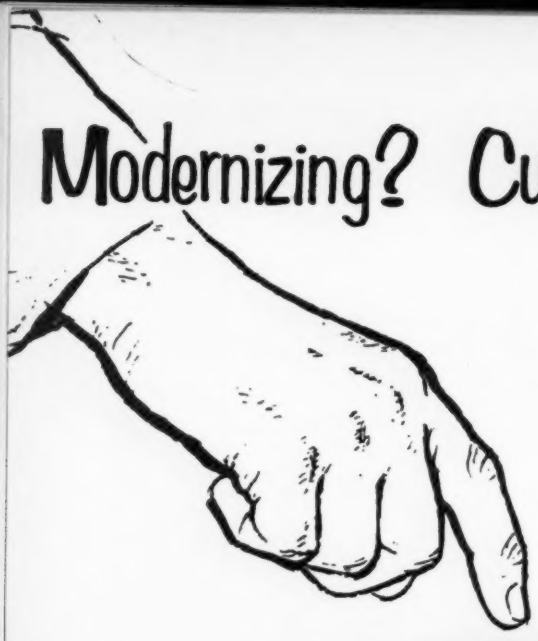

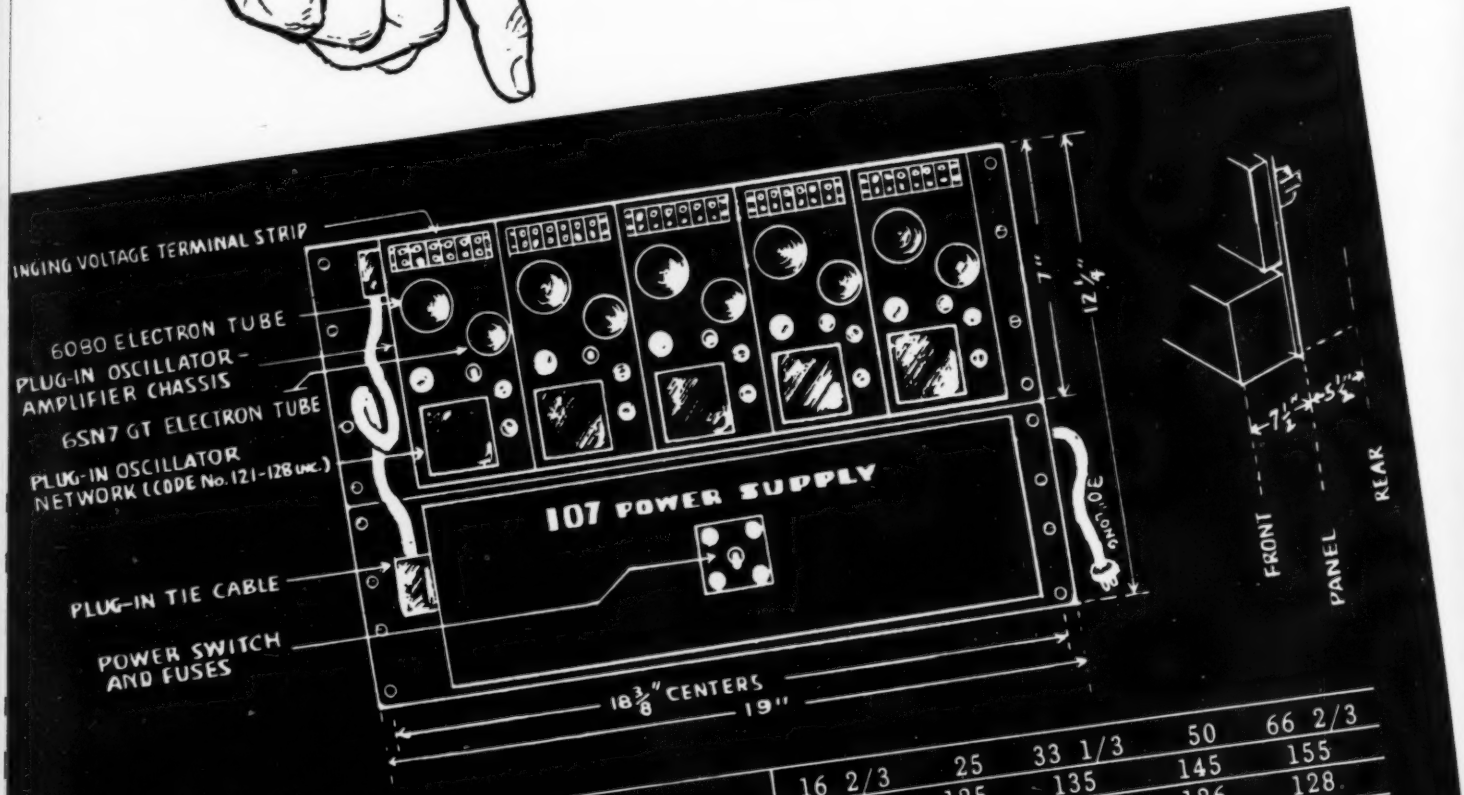

Code No. 101 Harmonic	Frequency	16 2/3	25	33 1/3	50	66 2/3
	*Nom. Ring. Volt.	105	125	135	145	155
	Osc. Net. No.	121	123	124	126	128
Code No. 102 Synchromonic	Frequency	16	30	42	54	66
	*Nom. Ring. Volt.	105	125	135	145	155
	Osc. Net. No.	121	124	125	126	128
Code No. 103 Decimonic	Frequency	20	30	40	50	60
	*Nom. Ring. Volt.	105	125	135	145	155
	Osc. Net No.	122	124	125	126	127
Code No. 104 Special	Frequency	20	30	42	54	66
	*Nom. Ring. Volt.	105	125	135	145	155
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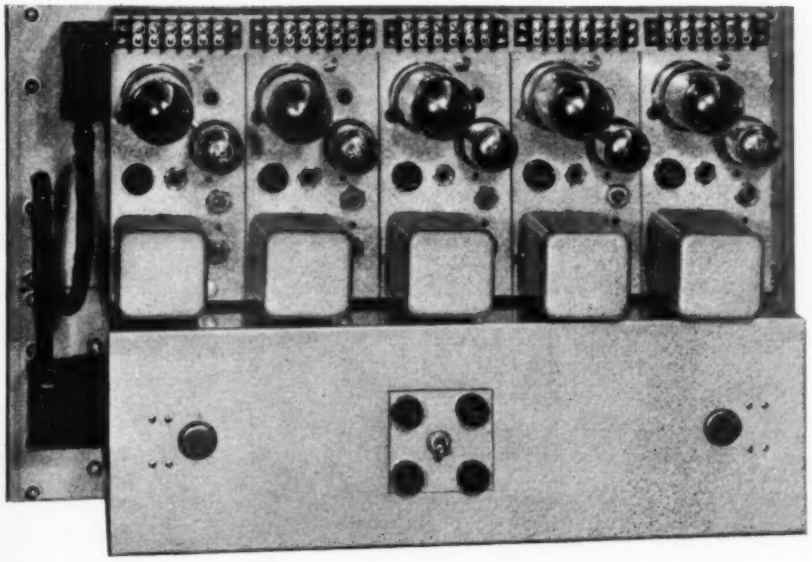

Write for your copy of the bulletin on the Kellogg Electronic Ringing Generator, today!

More and more independent telephone companies are adopting the Kellogg Electronic Ringing Generator as standard equipment. Here are a few of the many reasons:

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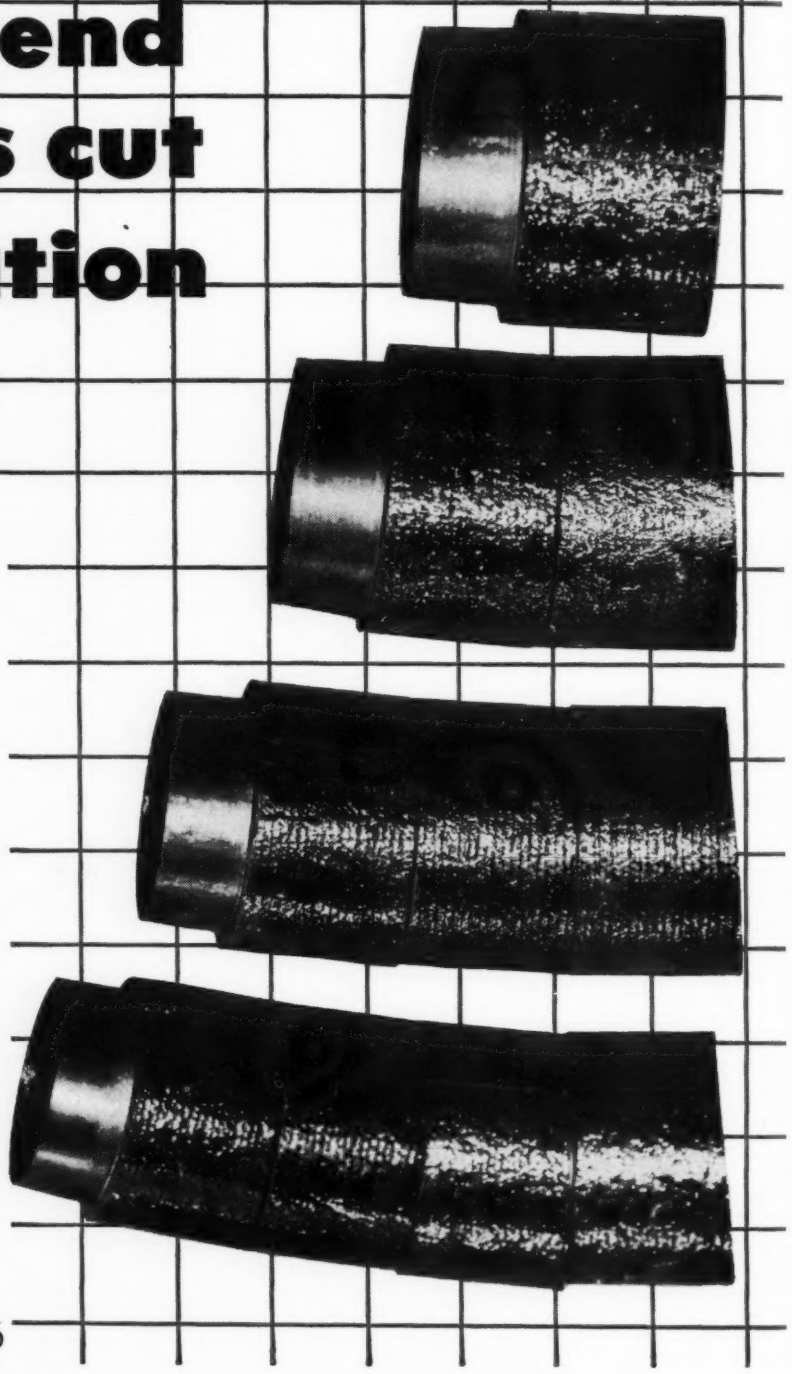
These bend sections cut installation costs



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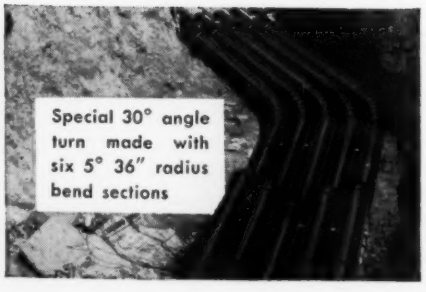

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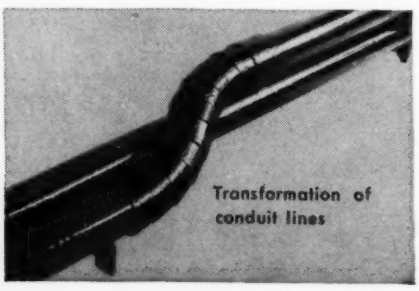
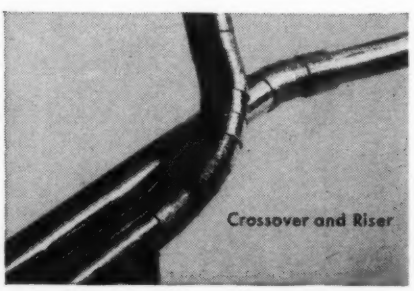


Transformation of conduit lines



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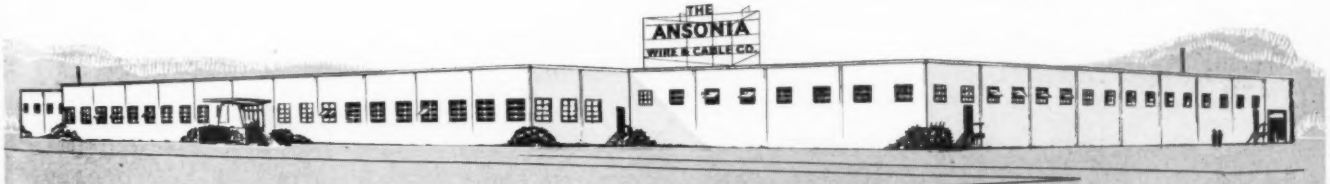

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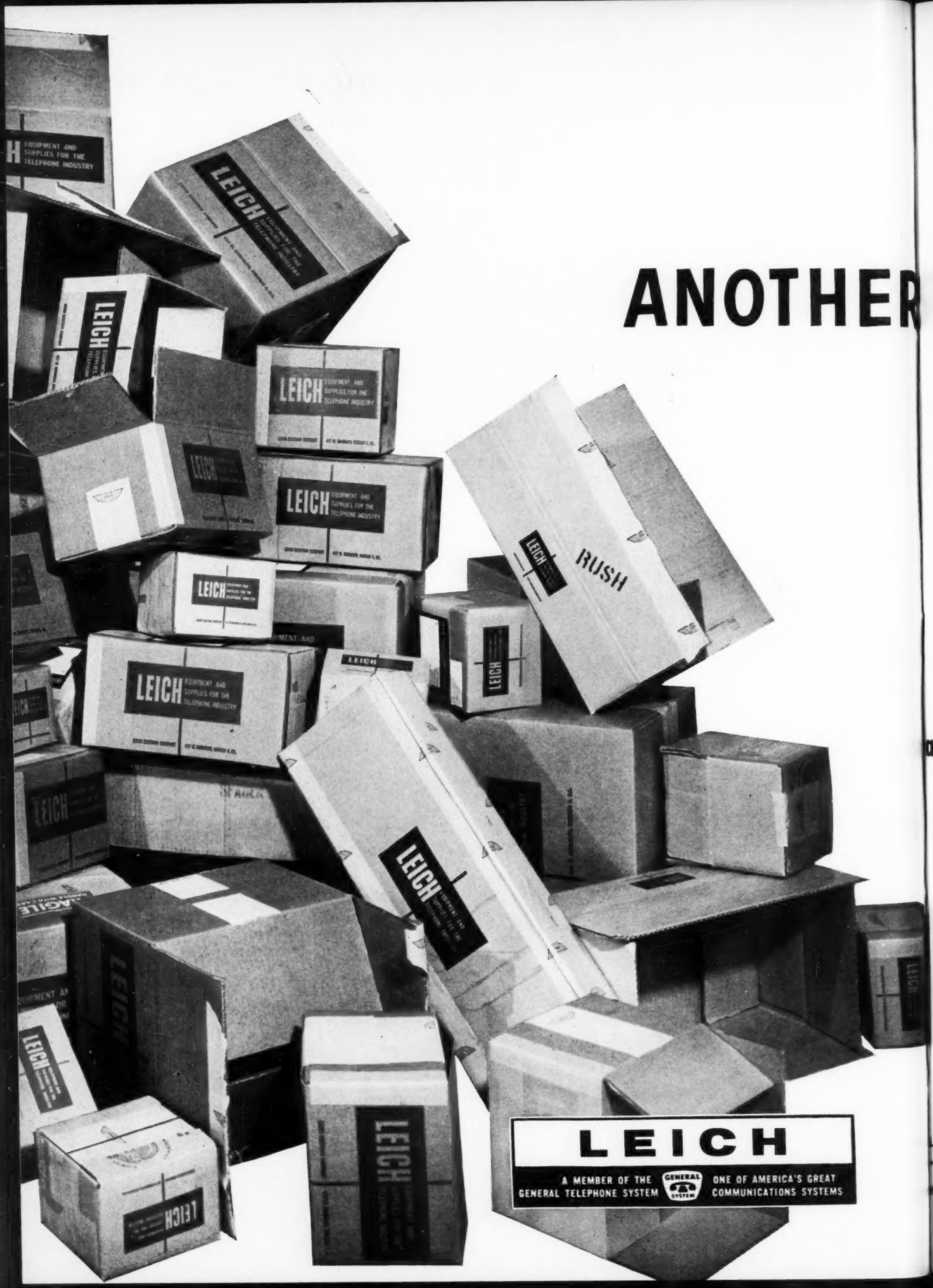
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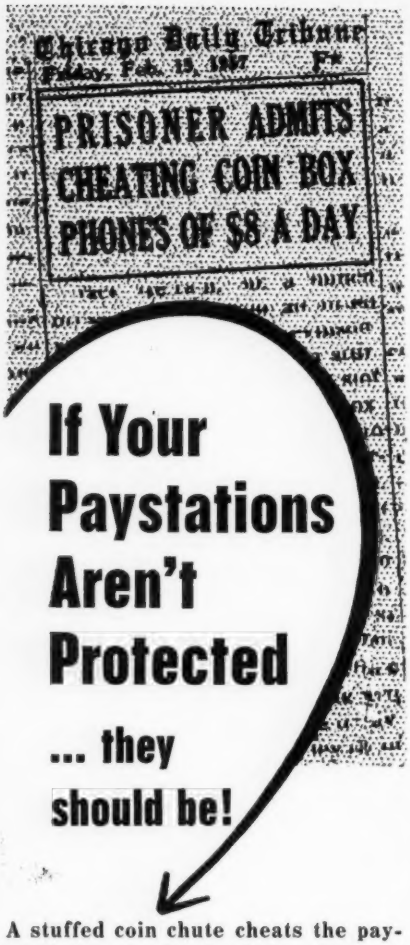
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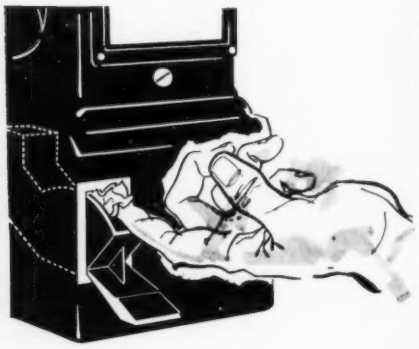

Automatic's Anti-Stuffing Coin Return fits both new and existing paystations. Write today for price and delivery information. Address: *Automatic Electric Sales Corporation, 1033 W. Van Buren St., Chicago 7. Or call HAymarket 1-4300.*

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New Autelco Paystation Offers Type 80 Telephone Features

Automatic Electric's new "80" series paystation has a familiar look to it. That's because it incorporates the outstanding features found in Automatic's famous Type 80 Desk Telephone.

Improved transmission is probably the most important feature of this paystation. The transmitter and receiver are non-positional, to help give lifelike reproduction of speech. Through the use of an entirely new induction coil and balancing network, the anti-sidetone balance has been greatly improved. This reduces sidetone, over a variety of line conditions, and causes the user to adjust his voice to the level which will give the most effective transmission. A simple adjustment enables the installer to adjust the line current for best transmission, whether line is short or long. This assures all-around efficiency on both local and long-distance calls.

Paystation users will particularly like the lighter, shorter handset of the "80" series paystation. Its lightness means it's far less tiring to hold, and the contours provide an easier grip. Because the handset is shorter, the user can talk directly into the transmitter and slightly to one side. This helps increase the volume and improves transmission quality. The receiver cap fits the ear better, too—helps reduce pickup of room noises.

Another popular feature of the AUTELCO paystation is its springy Koiled Kord. When this cord is extended, and then released, it instantly recoils into place. What's more, it won't ever kink or become knotted. The Koiled Kord is moisture-proof, as well.

FULL RANGE OF COLORS

To all these features the "80" series adds paystations in color. Many telephone companies have found that this feature helps "sell" paystation installations in locations where black instruments are not acceptable. Paystations in color are perfect, for example, in beauty parlors, where women have plenty of time to converse. The AUTELCO "80" series paystation may be ordered in any one of the eight beautiful colors used on the Type 80 Telephone. The colors are: Dawn Gray, Sand Beige, Sunlight Yellow, Turquoise, Colonial Blue, Classic Ivory, Jade Green and Garnet Red. With this wide variety to choose from, you'll be able to select colors that will blend or contrast with countless surroundings, and to help bring in additional revenue.

What a beauty! In this case we're referring to the new AUTELCO "80" series paystation, shown here in Classic Ivory. The paystation is available in 7 other colors and has the famous Type 80 Telephone features.

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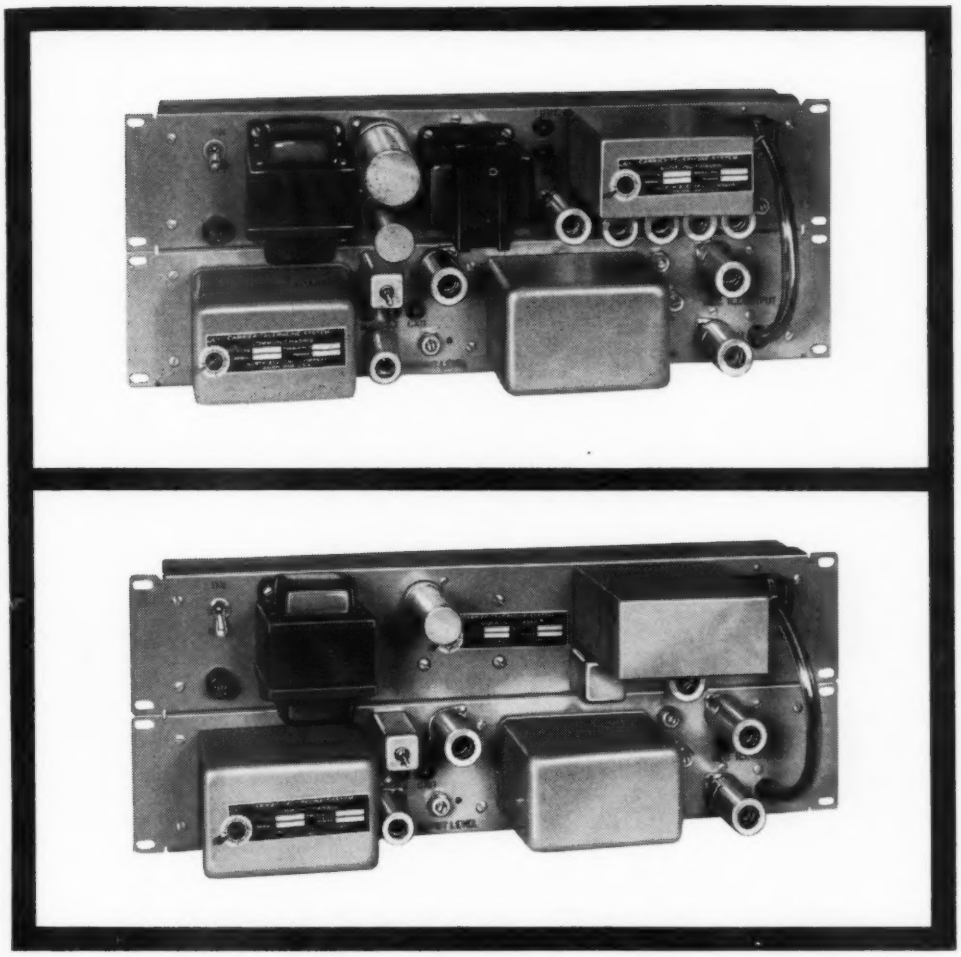

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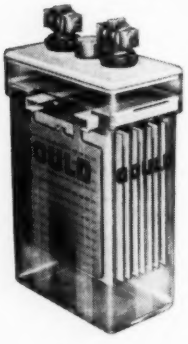

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How Many Sides Has Regulation?

Public utility regulators criticized for using past accounting records as substitute for statement of current values in setting rate bases, which is unfair to utility investors. Regulation will be jeopardized if it does not deal with investors and consumers alike — can be continued successfully only through just laws and honest practice, which recognize living values, or at least a reasonable facsimile.

By FRANCIS X. WELCH*

THE TITLE of my talk, "How Many Sides Has Regulation?" reminds me of a story. It is not a very funny story. In fact, in a way, I think it is a kind of a sad story. But it is a true story and I believe it exemplifies a serious difficulty which is facing the telephone industry in many parts of the United States, particularly here in New York State.

The story has to do with the great Irish conductor and composer, Victor Herbert, who passed on in 1924. Shortly before that, Herbert was touring the country, speaking to young people trying to get them interested in good music instead of the jazz trash of that day, which was just as bad as the bop slop of today. He happened to visit a college, where I was a student, to lecture on music appreciation. Herbert came across one young man who bragged that he had never, in his whole life, attended a symphony concert.

"Why should I?" he asked. "I've got my records, all the finest music by the greatest orchestras and singers. When I want to hear them I just sit home and play my records."

Mr. Herbert looked at the young man sadly and said: "You know, I feel sorry for you, my friend. You remind me of the boy who spent all his time in his room admiring his collection of pictures of bathing beauties. (They did not call them pin-ups then.) This foolish boy never realized that the sweet little girl who lived right next door had something that the picture girls didn't have."

Now, the point I am trying to make is that some of our public utility regulatory thinking, in recent years, has been exactly in line with the thinking of that boy who fell in love with mere printer's ink, with a synthetic reproduction of something already in the past, in preference to present-day living values.

This school of regulatory thinking has fallen in love with accounting records. These records have come to be idolized to the point where they are actually preferred to living experience, to present-day values. Like the pretty girl who lived next door, present-day living values have some qualities which can never be obtained from past records, no matter how well organized or perfectly kept.

Understand, I am not saying a word against accounting—good, sound, and complete accounting, without which regulation would be hamstrung, if not impossible. What I am suggesting is that accounting should not be used as a substitute for living regulation.

Supported by Others

This is not an original idea, of course. I could quote high and respectable authority on accounting, such as Prof. William A. Paton of the University of Michigan, a former president and founder of the American Institute of Accountants, to the effect that accounting regulation should not be used as a substitute for any statement of values, as such, whether for rate-making or for any other purpose. Accounting is a record, and only a record. It is a statement of costs, past costs.

Naturally cost accounting must be based on original cost of property accounted for—the same as depreciation. But, when we attempt to go further and try to make a statement of past cost experience substitute completely for any concept of present or future values, we pervert and distort the natural function of accounting records. We seek to make it serve a purpose for which it never was intended. We might as well try to control the state of the weather by monkeying with the barometer.

One of the most trenchant remarks made on this subject was made by the president of your USITA, who preceded me on this program, my good friend, Don Power. He said, I believe, that one of the troubles with regulation could be that some of the experts seem to know the price of everything but the value of nothing. We all know that there is a difference between value and cost. We come across it every day.

*Mr. Welch, our Washington editor and editor of *Public Utilities Fortnightly*, gave this address at the recent convention of the New York State Telephone Association.

You do not need to look any further than your own house or your own automobile. If you have bought a house or some real estate within the past 10, or even 20, years and have kept it in reasonably good condition, or made some improvements, I wonder how many of you would be willing to sell it at the original cost to you, less so-called depreciation, plus the actual cost of improvements.

Next, take your car down to trade it in for a new one and start talking to the man about what it cost you originally. He will not be interested. He will probably pull out his little blue book, and count the dents in your fenders, and listen to the knocks in your motor, and then he will tell you what the trade-in value of your car is.

The same is true on the real estate taxes we pay. The tax assessor has his own scale of values on which the tax is fixed. He is not interested, except maybe for comparative or index purposes, in what you happened to have paid for the property, or whether you even paid anything at all for it. You are just taxed on value.

Controlling for Utilities

Now, it is an interesting but understandable thing that only in the field of public utility rate regulation has this cost, as distinguished from value, become completely controlling. I say it is understandable because, in our comparatively short history of utility rate regulation by state commissions (which began just a half century ago right here in New York State), there has been such a confusion of evidence and formulas and methods of approach.

I am sure that you know by this time that I am referring to the controversy going on in New York as to whether your legislature should change your telephone rate law from a basis which requires some consideration of replacement value, as your highest state court has held, or whether it should go back to the old, and I might say reactionary, basis of strict conformity with original cost.

Of course, the bookkeeping school of regulation has always liked original cost because it is an ascertainable fact. It is more convenient, more mathematically precise, more defensive from a political point of view than any attempt to base rates on a value which is often a matter of opinion. And, I certainly would not want to say that if, as, and when a cost basis can be used, even as a point of departure, upon which there can be erected *some semblance of current value* (some effort to recognize what the present investment amounts to) it should not be so used.

But, it is the idea that original cost records themselves are sacred, or should be always used exclusively without value adjustment for rate-fixing, which can become unfair in a rapid inflationary period.

I go further and say it can become actually dishonest, and the telephone industry here in New York has a right to fight any such change on exactly that basis. It is a fight against the use of a stacked deck with marked cards which sooner or later could bring telephone companies to their knees, financially.

Now, let me hasten to assure you that I am not going to try to dredge up the old hackneyed discussion about original cost versus reproduction cost. That is an old story and a rather dull one and most of you are already familiar with it. I would like to discuss this matter on higher ground than the mere legality of regulation.

I would like to discuss the moral philosophy of regulation. That is the real point of the title of my talk—"How Many Sides Has Regulation?". My answer is that there are *no* sides to regulation. There is only one goal —the public interest.

Now that last remark may strike some of you as rather unworldly or impractical. It might strike you as something like the old colored preacher who was accused of being narrow or biased in his views. He said: "Sure, I's biased. I always has been biased. But, the important thing is that I's biased in favor of the Lord!"

Considered One-Sided

Let us admit, however, that in recent years, perhaps beginning with your own former governor, the late President of the United States, Franklin D. Roosevelt, there was a tendency in this country to consider utility commission regulation as a one-sided proposition.

The Public Service Commission of New York, said Roosevelt when he vetoed a bill passed by your legislature in 1930 to set up a people's counsel in utility rates cases, is supposed to look after the people's interest. That was true as far as it went, but he implied that the public utility investors could mighty well look after themselves.

This was in direct conflict with the views expressed at that time by a former chairman of your New York Public Service Commission, William A. Prendergast. You may recall that Prendergast resigned over this issue.

Yet, if you care to look at the regulatory law of this state, and of every other state in the Union, and all federal regulatory laws, you will find that the regulatory commission is supposed to protect not just the consumer, not just the political subdivisions (such as the cities) or the attorney general, not just one class of consumer, but also the utility investor. The sum total of this is the public interest.

I think this view is best summarized by the present chairman of the Federal Power Commission (FPC), Jerome K. Kuykendall. Speaking in 1953 about financial regulation of electric companies, he said that the FPC's problem "does not consist merely of refereeing disputes between buyer and seller, although thorough consideration of the contentions of both parties is necessary in arriving at a just decision. The interests of these two parties are actually not as conflicting as they may seem. Both are best served by rates which provide the seller with adequate, but not excessive, income and enable the buyer to obtain satisfactory service at reasonable but not exorbitant rates. It is the task of a regulatory commission to try to find and maintain the balance which is required. When this is done, the public interest is best served."

Now, we all know that inflation is the pickpocket of the free enterprise system. But, whereas ordinary business enterprises can at least keep abreast by boosting their own prices, utilities are subject to rigid rate control. And, when that control is exercised on a basis which falsely assumes a relatively constant purchasing power of the dollar, such a regulatory formula becomes more and more unfair, depending on the degree of inflation.

If, for example, the purchasing power of the dollar fell to 10 cents in a single year (and such a drop is not unknown in the history of foreign currency) there is probably not a person in this country, certainly no responsible regulatory commissioner, who would seriously urge that utility rates for the future should be fixed on the basis of 10-cent dollars.

This is an extreme example, of course. But consider what has actually happened to our dollar. During the 15½ years since Pearl Harbor Day, it has lost half of its value, which is an annually compounded rate of loss of 4 per cent each year.

Franc Cited As Example

Now, if our dollar continued to lose value at an annual rate of 4 per cent for another 16 years, would there be anyone left even in Albany who would dare to say that strict original cost was a decent basis for utility rate making? Trouble is, if that happens, you may not be able to find very many utilities still operating as private profit ventures. And, maybe, some smart

people out in left field have figured it out just that way.

Consider what happened, for example, to the French franc. Since 1914 it has lost 99½ per cent of its value. The same meal that cost five francs in 1914 would cost you about 2,000 francs today. If a young Frenchman of 22 had a paid-up annuity in 1914 to provide for his own pension at the rate of 1,000 francs a month (equal to about $225—a comfortable income in those days) to start at age 65, which is this year, 1957, how much do you suppose this return of 1,000 francs on his original investment would yield? About the price of one square meal a month! About $3.25.

What happened to the French utilities during this period? Take a look! Government ownership by default, every one of them—gas, electric, railroad, telephone. They collapsed under the double pressure of economic inflation and weak-kneed political resistance to necessary compensatory rate increases.

Understand, I do not contend that a fair value rate base instead of original cost would solve utility problems if such a collapse of the dollar happened to us (and I pray it never does). But at least it would be a lifesaver, holding the utilities' heads above the rising waters of inflation, just as the dead anchor of original cost would inevitably drag them down into the depths of insolvency.

That is why there has been a movement, if not a trend, away from strict original cost rate-making since the end of the war. I recently had occasion to compare the two periods in my TELEPHONY column. I found that, whereas in 1947 there were 30 state commissions using a cost rate base and only eight states recognizing any element of current value, today there are 28 states still using cost (including the latest switch back in Maine this month), but there are 17 (including most of the larger states in the Union) now requiring some recognition of value in the rate base. So, now is New York State going to turn around and go in the other direction like Maine did?

Inflation Almost Normal

There is one peculiarity about the present state of our economy which should give all utilities some concern in this respect. That is the fact that inflation with us is becoming more and more frequent. It is even approaching a point where it is almost a normal condition.

If we go back 100 years in our history, we find that the American dollar, for considerable periods, showed a tendency to stabilize and even recover purchasing power lost during wartime inflation. It recovered after the Mexican War. It recovered after the Civil War. It was not very much affected by the Spanish War because it had already recovered considerably following a depression of the early 1890's.

Most of us here can remember how the dollar recovered its purchasing power after World War I. And after World War II it was expected that it would recover again. It never did. Why?

During each of these earlier postwar recoveries, there were periods of readjustment, depressions, etc. But now our economists tell us that we have built into our economy certain protection against depression. We are not supposed to have another depression because of these built-in safeguards, such as minimum wages, labor contracts, government spending, etc.

But, the question public utility people must ask themselves is whether in the process of building in safeguards against a depression we have not built a permanent state of inflation. According to the Keynesian theory and its champion, Leon Keyserling, this is even a good thing.

I do not know. I wish I did. But the fact remains that the dollar did not recover after World War II or even after the Korean War. There is no present expectation that it will do so in the near future. It could even go the other way, in the form of galloping inflation, under conditions which we all hope will not happen.

Where does that leave public utility companies—trying to operate under a regulatory system rigidly tied to dollar values of years gone by which will never be recovered. At some point, presumably, if inflation keeps on, a good many more commissions and courts will admit that the cost base is no longer workable.

But, how long will the utility investor put up with that, while politicians try to take advantage of natural popular resistance to inevitable rate increases.

I say public utilities cannot be forever crucified on academic theories of regulatory accountancy which are not working out. They are breaking down under the constant hammering of inflation.

This brings me to a point I would like to make about the moral philosophy of regulation. Maybe you never heard that expression before and never knew there was such a thing.

But, I would like to submit to you that the moral justification of regulation does not depend on statutory law, or the absence of law, or any change the legislature might make in the law. Certainly, it does not depend on the barebones minimum level of non-confiscation provided by a constitution, whether state or federal. Furthermore, under our system of government such things are supposed to be taken care of at the state level.

Morality Left To States

Now, it is an interesting thing that the Constitution of the United States does not provide for federal legislation generally against the moral type of crime, except in certain instances involving operations of the federal government. Why is that? Were the founding fathers insensitive to the moral code? Not at all.

As I said before, the founding fathers purposely left that sort of thing up to the states. They felt, and rightly so in my opinion, that the police powers should be close to the people in the areas and communities where they live and make their own laws.

When I first heard a learned judge make the comment that there is no "built-in" Ten Commandments in the Constitution, I was a little surprised. I asked him what would happen if a state was so callous that it did not bother to legislate against murder, or bigamy, or other crimes—would not the federal government step in to give citizens in that state protection?

The learned judge pointed out to me that a number of states had openly condoned conduct which most other state see fit to restrict by law. Gambling is legalized in Nevada, and some other things which I had better not mention were allowed here and there at one time or another. But eventually the moral consensus of the majority of the people in those states asserted itself. They cleared up their own mess. That is the way such things ought to be taken care of, not by an edict from Washington, D. C. Our federal Constitution assumes that it is up to the states, the people who live in those states to make the kind of laws they want or think they need, the kind of laws they think are right.

I did not want to spend so much time on constitutional philosophy. But, it is the basis for the main thought I want to leave with you today. This all leads back to your telephone rate-making problem here in New York State. And, it is simply this.

Because the federal Constitution does not attempt to legislate local morals, or restrict local conduct, there has grown up in this country a theory, which some students of legal philosophy call the "bad man's" theory of the law. And, I will say right off it is a very

bad theory for public utilities. Its principal exponent was the late Supreme Court Justice Oliver Wendell Holmes. And, if some of the things I am going to say sounds as if I am not a devout admirer of Justice Holmes, let me hasten to assure you that you are perfectly right. I am not.

If you are interested in a further discussion of the differences between the "bad man's" and "good man's" theories of the law, there was a very excellent article on this by Julius Cohen in the Spring, 1956 issue of the *Cornell Law Quarterly.*

Suffice it for now to say that the "bad man's" theory of the law is that no one should be held to any abstract moral accountability under the law, but only to the most limited concept of statutory responsibility. The test is not what the "good man" would do in any given situation, but what the "bad man" can get away with.

Theory Explained

Now, shocking as that may seem, I am afraid most of us accept and practice the "bad man's" theory of the law in some circumstances, such as criminal law and tax law.

Suppose your lawyer came to you, for example, and said that he had discovered an unexpected but perfectly legal loophole in the Revenue Act, whereby you could save a large amount on your income tax. You would probably thank him. You would probably tell him to go ahead and prepare your return along those lines. I know I would!

But, suppose he also told you that he was sure, from a study of the Revenue Act and the reports of the committee, etc., that Congress had never intended that you should enjoy such an advantage. Suppose he told you that, as a good patriotic citizen, you ought to pay more taxes and forego the advantages of the loophole. You might think that lawyer had rocks in his head and you might even look around for another lawyer. I know I would!

Now, here is the distinction I wish to make. It is traditional in criminal law, in contrast with other kinds of law, to resolve all doubts in favor of the accused—to give him every break or advantage. That is the "bad man's" theory of the law, and that is a proper place for the "bad man's" theory.

But, regulatory law is not criminal law, even if some congressmen and others seem to confuse the two at times. Regulatory laws should be administered under the "good man's" theory and if it is not, all of us—public interest, if you will—are going to suffer for it, sooner or later.

I would like to suggest, therefore, that regulatory law is no place for the "bad man's" theory, whereby politicians think that any advantage that can be taken of the utility investors by repressive rate regulation is perfectly lawful and ought to be taken.

Aside from moral consideration, this idea that utility investors are a rich minority who can look after themselves, can be the most shortsighted and destructive influence that could possibly be injected into regulation. It may be lawful under state legislation. And, if it is not lawful at the time, it may be possible to make it lawful by changing the regulatory law.

It is possible for your legislature to change the rules in the middle of a rate case. But, is it fair or morally justified?

The answer may depend on whether

(Please turn to page 46)

REA Makes 1000th Rural Telephone Loan

The Rural Electrification Administration has made its 1000th telephone loan, the U. S. Department of Agriculture announced on June 12.

The Farmers Independent Telephone Co. of Grantsburg, Wis., received the 1000th loan in the eighth year of REA's rural telephone program. It was in the amount of $492,000 and will be used to provide modern dial service in Polk and Burnett counties in Wisconsin.

This brings the total of REA loans for rural telephone facilities to 382 million dollars. These loans will enable 540 Independent telephone companies and cooperative associations to provide modern dial service for more than 840,000 farm families and other subscribers in small towns and rural areas. As of April 1, 295 of the borrowers had placed in service 1,130 new automatic exchanges and constructed nearly 100,000 miles of telephone line.

The Grantsburg company plans to convert its system to dial operation and add facilities to serve 245 farm families now without telephones. It now provides magneto and common battery service for 752 subscribers and switching service for 104 other families in the area.

New facilities to serve the expanded system will include 65 miles of line and automatic central offices at Falun and Trade Lake. The Grantsburg exchange building will be remodeled to serve as headquarters for the system and to provide space for installation of automatic facilities. Of the existing line, 37 miles will be retained in place, 168 miles will be rebuilt and the remainder retired.

The Farmers Independent Telephone Co. observes its 50th anniversary this year.

Clarence Johnson is president of the company and Leonard Linder is manager.

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Two other telephone companies also have received REA loans.

Western Arkansas Telephone Co., Russellville, Ark.; $450,000, second loan (June 7).

The borrower will use these funds to provide facilities for initial service to an additional 295 farm families not included in the first loan, and to complete the system.

The two REA loans totaling $2,882,000 will finance new and improved service to 8,901 subscribers. The system will consist of 15 automatic exchanges at: Atkins, Booneville, Clarksville, Dardanelle, Dover, Hartman-Coal Hill, Hector, Lamar, London, Paris, Pottsville, Ratcliff, Russellville, Scranton and Subiaco. An unattended toll board will be installed in the Russellville building which will handle the major portion of the toll calls for the system.

S. A. Lane is president and manager of the Western Arkansas Telephone Co.

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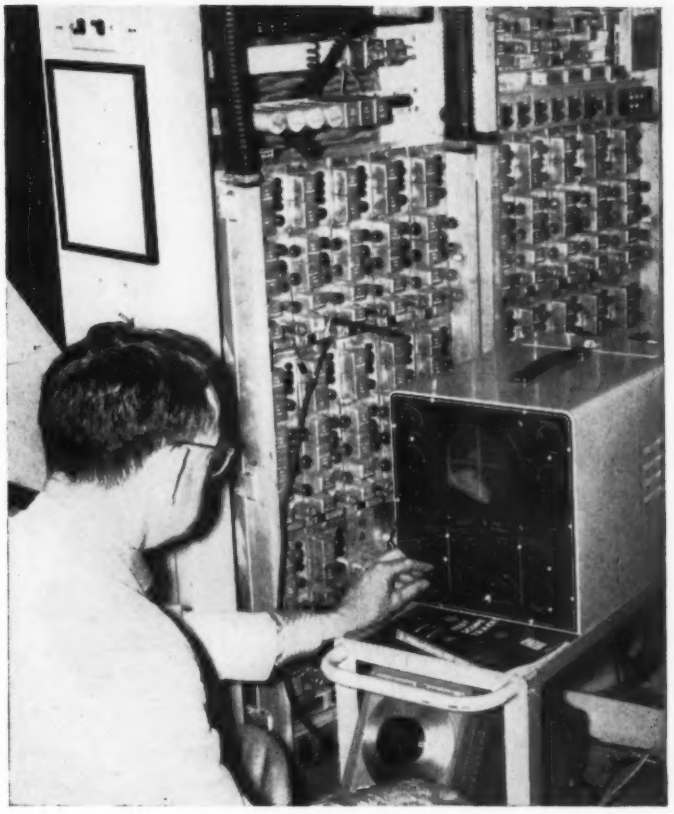
McCloud (Okla.) Telephone Co.; $42,000, second loan (June 7).

The borrower plans to use this loan, together with a prior loan, to provide new and improved service to 645 farm families. The additional funds were made necessary by the rise in construction costs since approval of the original loan.

Charles Blakeley is president and manager of the McLoud company.

XUM



The oscilloscope proved of considerable value in analyzing carrier operation. Such things as degree of modulation, distortion, effectiveness of compression and interference were shown up in "picture" form. (Photo by Louis Landman.)

PART 4

Use of the Oscilloscope in Telephony

By **HAROLD B. McKAY, TELEPHONY'S Electronics Editor**

PREVIOUS ARTICLES in this series described the application of the cathode ray oscilloscope to the electronic features of the telephone plant—the carriers and repeaters. The scope also can perform valuable service in the maintenance of the non-electronic portions of the plant—the relays, contacts and magnets.

The most commonly used pulses in telephone work are probably the dial pulses. These are the interrupted direct current spurts which are produced by a telephone dial. As generated by the dial, these pulses are square waves which are just about perfect, and an oscilloscope connected to a dial, battery and resistor in series will show a clean wave form.

This wave becomes distorted and changed in dimensions as it is transmitted over cables, wires, through coils, relays or other apparatus. Yet the customer's service depends largely on how well these pulses are finally received by the apparatus which is to be controlled.

In many step-by-step systems, the switch which is actuated by the dial pulses moves on the break of the dial. That is, when the dial makes, an electromagnet pulls up an armature. This armature, when it releases on the break of the dial, moves the switch. Therefore, the per cent break of the dial and intermediate apparatus becomes of prime importance.

Inductive lags on lines and apparatus tend to extend the duration of pulses; relays sometimes take longer to release than to operate. As a result, many systems lengthen the per cent break to offset these influences. This can be measured by meters which respond to the average amount of current sent through the pulsing contacts and thus show a per cent break.

However, contacts of all sorts may bounce, or chatter, or spark and, thereby, alter the make/break ratio in various circuits.

Some circuits with equipment using electrical magnets require that operation be definite and positive on the first try. An example of this is the perforating device used with automatic message accounting in Direct Distance Dialing (DDD). This system requires that an embossed dent be made in a strip of paper by the operation of a plunger on a relay armature.

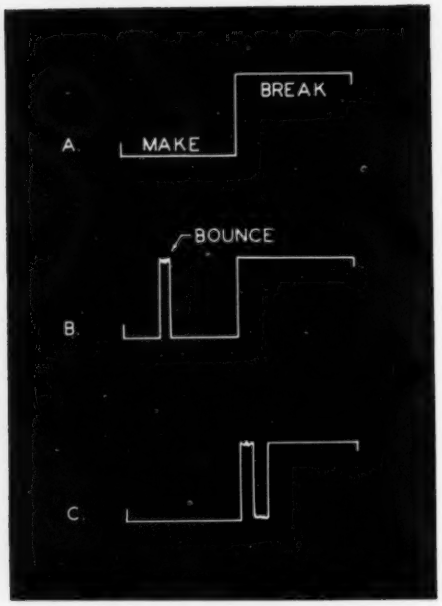


Fig. 4.1. A pair of pulsing relays in a dial outpulsing sender made a wave form like the one shown in (A) when working correctly. In (B) one relay had contact bounce, in (C) the other bounced. Trouble was caused by excessive armature travel.

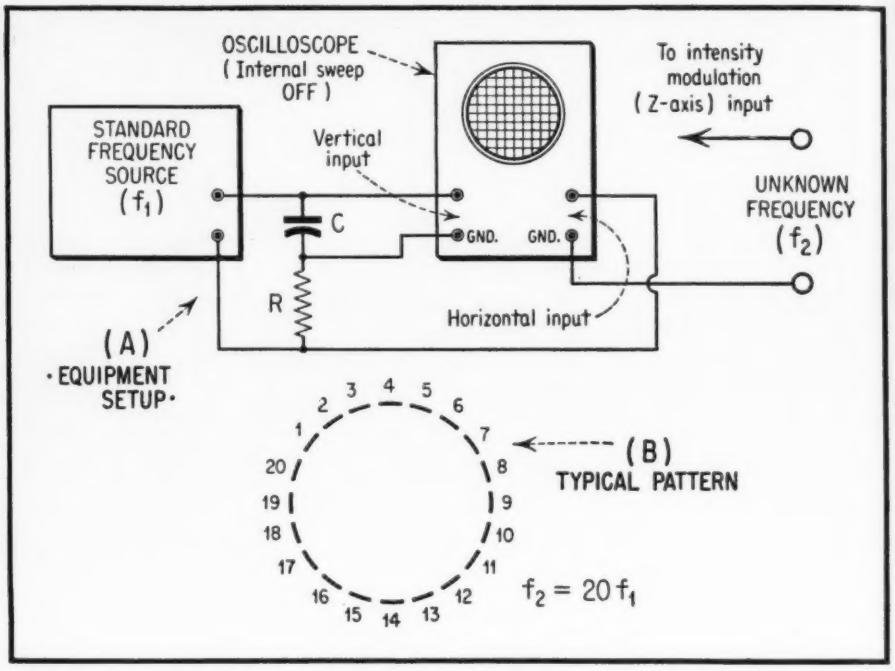


Fig. 4.3. The dot-wheel pattern is a method of identifying an unknown frequency. When the scope is connected as in (A), a pattern like (B) will appear on the screen. Multiplying the known frequency by the number of dots in the wheel gives the unknown frequency. C and R will vary with frequency. They must produce 90° phase shift. (Courtesy, Cornell-Dubilier Electric Corp.)

Bounce

If the plunger bounces, an imperfect mark will be made in the paper, rendering the record useless.

Trouble of this sort can be tracked down very simply with an oscilloscope. *Fig. 4.1(A)* shows a normal dial pulse as put out by a dial or a dial pulsing sender. *Figs. 4.1(B)* and *4.1(C)* show trouble in output of the relays in a dial pulsing sender. In the first case, there was too much travel of the armature of the first relay of a pulsing pair. The second example shows the same trouble in the second relay.

In these cases, the "scope" screen actually reveals the bouncing and arcing of the contact as shown. To the eye, this relay appeared OK, but actually this failure to make firm contact reduced the make/break ratio and could interfere with service.

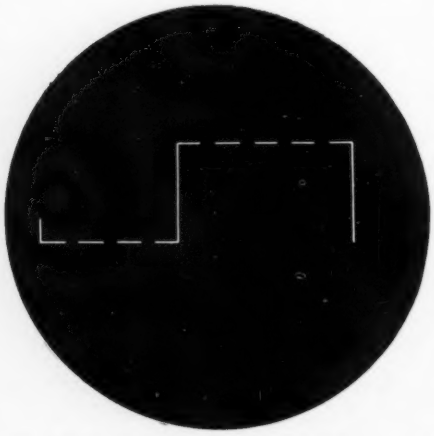


Fig. 4.2. Timing dots may be created by putting ac of known frequency on "Z" axis of scope, while measuring contact action on vertical plates. If 60-cycle is used, above figure shows that duration of pulse is 9/60ths of a second, with 4/60ths break and 5/60ths make.

Timing Pulses

The actual number of pulses per second, and the per cent break of any circuit can be determined with a cathode ray oscilloscope. Scopes of the quality used in these experiments have a binding post on the panel which connects to the grid of the cathode ray tube. This may be called "intensity modulation" or "Z axis".

If voltage is applied to this terminal, it will cut off the cathode ray, causing the tube to go dark. If an alternating voltage is used, the beam will switch off and on in step with the alternations. This feature can be used to time the duration of any figure appearing on the screen. The pulse shown in *Fig. 4.2* is a regular switching pulse. It is made to appear dotted by connecting 60 cycles to the intensity modulation. By counting the number of dots, one can determine how many 60ths of a second long the pulse or any part of it is.

Instead of 60 cycles, an oscillator can be used and set for any frequency, such as 1,000 cycles. The dots which appear will then represent thousandths of a second.

The per cent break of any pulse can be determined by merely measuring the space taken up by each part of the pulse on the screen. If it became necessary to test a number of dials or relays for per cent break, a strip of paper calibrated in per cent could

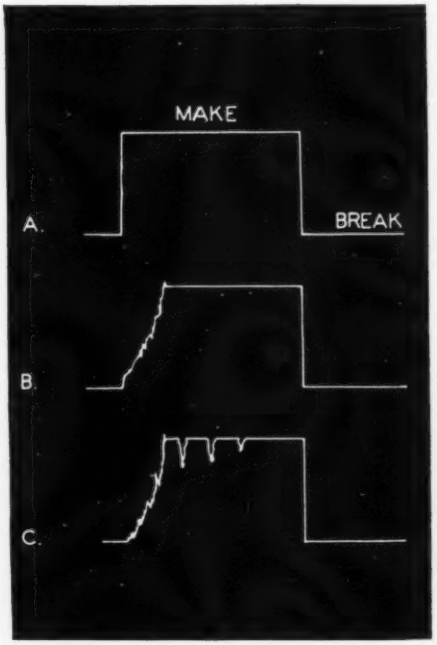


Fig. 4.4. Contact bounce. (A) is an ideal make-and-break pulse. (B) shows permissable bounce. (C) is excessive bounce resulting in a trouble condition. Some apparatus might count this as more than one pulse because of the bounce.

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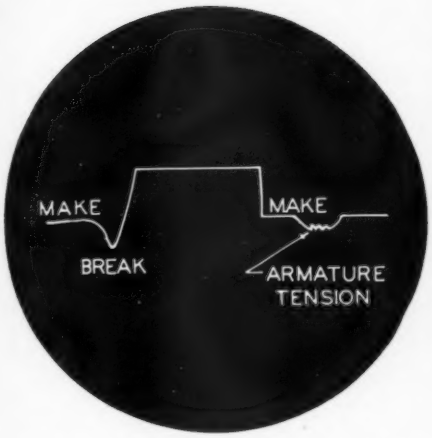


Fig. 4.5. Oscilloscope presentation of a stepper relay in a panel system sender. The raggedy condition at the end of the sweep was caused by improper adjustment of a retractile spring which pulls the armature back. The break pulse dips downward before going up because of inductance. This is normal. Any "scope" picture may appear reversed to these examples, depending on way leads are connected.

be pasted on the front of the cathode ray tube for the tests.

The use of dots for measuring frequency is a good trick to know. *Fig. 4.3* shows a method of connecting a "scope" to produce a dot wheel. The ratio of one frequency to another can be found out by counting the dots once the pattern is made to stand still.

Switching Pulses

Pulses other than dial pulses are used throughout the telephone plant. These include the revertive pulses used in panel and common control crossbar as well as teletype, telemetering and data circuit pulses. All of these can be displayed on a "scope" and interesting things discovered about them. Illustrations included with this article *(Figs. 4.4 to 4.8)* show some of these different pulses, both as they look at the point of generation and after they have traveled over cable pairs and through other apparatus.

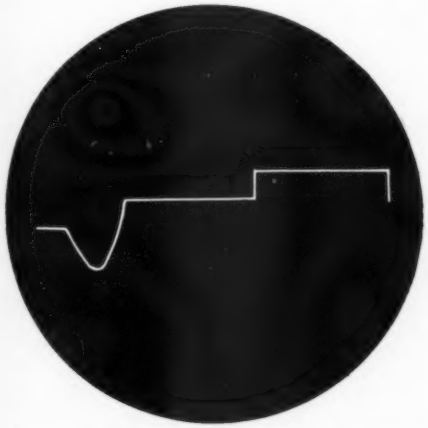


Fig. 4.6. This is a revertive pulse from a panel dial commutator in the same building. Its clean condition means that the commutator is clean.

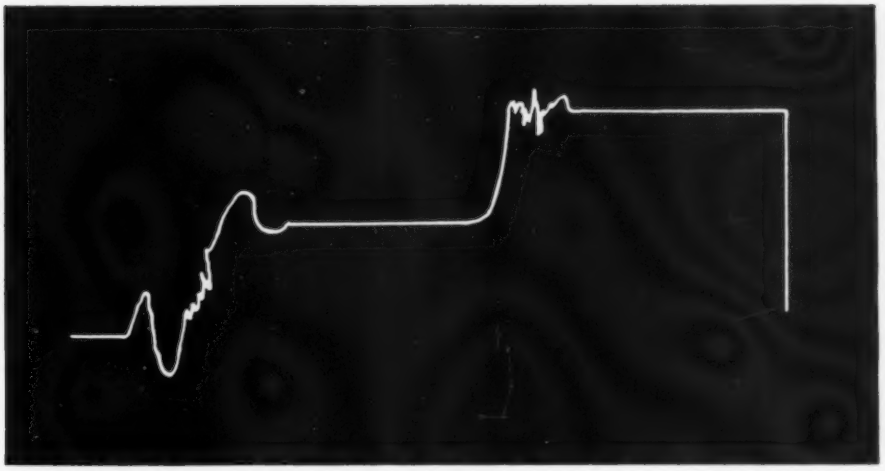


Fig. 4.7. This is a pattern produced by a crossbar tandem revertive pulse incoming. Some permissable contact bounce or arcing shows. Curved contour of lines is caused by inductive effects, such as cable loading.

While it is beyond the scope of these articles to analyze all of the features of the displays that can be produced on an oscilloscope, the telephone man's trick of comparing a good circuit with a bad circuit is a handy thing to do here. If in doubt as to whether a trace is "normal" or not, make a similar test on a circuit known to be good and compare the two.

Contact Protection

Among the other things in telephone plant that can be tested with a scope is contact protection networks. Normally when a contact breaks under an inductive load, a high voltage is developed.

This results in an arc at the contact and on a scope it shows as a sharp spike which may extend off the screen. Contact protection networks are supposed to reduce or absorb some of this surge. A scope will show whether such a network is working or not.

In one office it was found that carbons on the protector frame were frequently arcing over on coin lines. An oscilloscope connected to the coin control supply showed that some coin relays in the telephone sets produced a serious back-kick of voltage which was high enough to arc over the carbons.

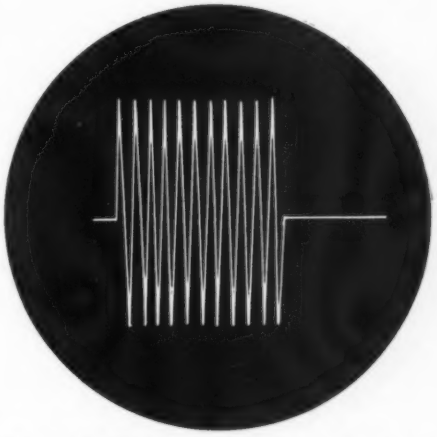


Fig. 4.8. This is a dial pulse as transmitted over a voice frequency facility. The up-and-down lines are the ac to which the "make" pulse has been converted. The straight horizontal line is the "break."

The next article in this series will list precautions to be observed when connecting an oscilloscope to telephone plant.

Watch for Mr. McKay's

Three-Installment Article on

"SQUARE WAVE TESTING"

To Start Soon

Utilities and Commissions

Must Safeguard Private Enterprise

By R. B. THOMAS*

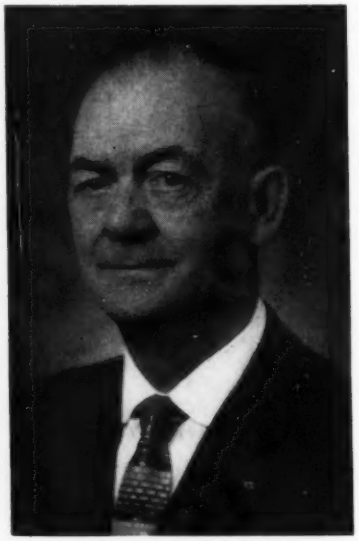
I ALWAYS ENJOY meeting with my friends in the Illinois Telephone Association. I'm particularly happy to be with you at this convention to help celebrate the 60th anniversary of the United States Independent Telephone Association.

In addition to my personal pleasure at meeting with you again, I get a lot of satisfaction from being asked to talk with you for the third time in my professional capacity as chief engineer of the Illinois Commerce Commission. I think that everyone concerned with utilities and regulation benefits when you utility people and we regulatory people—who so often are in opposite corners in rate case and other matters—can meet together on occasions like this discuss our joint problems in a spirit of cooperation and mutual tolerance for each other's views.

As you know, Chairman George Perrine of our commission has consistently urged that we commission people try to get the greatest possible understanding of your problems and from my experience I know that this is the sincere wish of all the commission members. While, in speaking for the commission Mr. Perrine has said that "we cannot by choice be on any one side of the fence," he doesn't regard our function as that of restrictive regulation. Far from it. His conception of "fence-sitting" is one which finds the commission on cooperative and friendly terms with both the utility and the user, working with both sides to safeguard the benefits of free enterprise to each.

In this spirit, let me join with many others in offering my congratulations to you on your 60th anniversary. In spite of your accomplishments and the publicity you properly have given them, there are more than a few of our Illinois citizens still unaware of the tremendous contribution the non-Bell telephone companies are making to the social and economic life of the state. There are still some who do not realize that 80 per cent of the area of this state (Illinois) is served by Independent companies, much less that there is an imposing total of 11,000 telephone exchanges in the United States owned and operated by the Independent fraternity.

By and large, you folks have unquestionably done a tremendous job of meeting the expanding requirements for telephone service throughout the state during the postwar period. A few days ago I obtained some statistics for the Independent segment of the industry in Illinois and found that your total telephones in service have increased from 376,000 to 628,000 since the war—a gain of 67 per cent. On the whole, you have followed dynamic policies. For example, your per cent dial stations has increased materially and now stands at about 55 per cent. Meanwhile, magneto stations have been reduced to about 15 per cent. And more than 40 per cent of your service stations have been converted to company-owned telephones over the past three years alone.



R. B. THOMAS

You have also gone right along with Bell in the introduction of new services and new operating methods. I have in mind such innovations as Direct Distance Dialing (DDD) at Flora, Hoopeston and Pekin; your mobile service installation at Casey; the automatic ticketing equipment operative for some time past in Des Plaines, Park Ridge and Pekin and soon to be cut in at Harrisburg; and the notable job you have done jointly with Bell in developing and implementing your fundamental service plans.

Even in the case of the smaller companies, representing probably the most serious problem in the industry, some progress has been made. Many of these companies, with the help of the commission staff or outside accounting and engineering firms have taken the necessary steps to get their financial houses in order, then applied for the rate increases which have been their only possible salvation during the past 12 years of price inflation and wage and other cost increases. At least some of these companies have recognized that such rate increases, while necessary and fair, are palatable to the public only if the service they provide is of high caliber. I am glad to say that in these instances substantial efforts toward im-

* Mr. Thomas is Chief Engineer of the Illinois Commerce Commission and he gave this address at the recent convention of the Illinois Telephone Association.

provement of service have been made prior to application for rate increases.

Few Brick-bats In Order

All in all, this adds up to an impressive show of progress. This has made our joint jobs easier and rebounds to the benefit of the telephone users in the communities you serve. Many of you individually here today are to be congratulated.

So much for the congratulations and words of praise — and well deserved they are. Unfortunately, there are also a few brick-bats in order, because in some sectors we still have a fairly long distance to go.

Certainly, we have by no means solved the uneconomic small company problem, including in that category both the privately-owned and mutual operators. I do not have to tell you that in many respects this is the most serious problem we in the commission have to face—even the people served by mutual companies seek our help though we have no jurisdiction. I think this is the Independents' problem too, as well as that of the Bell company. You have made some progress here but I still find a reluctance on the part of many of you to look this problem in the face and meet it head-on. We need your help in the reorganizations and consolidations which are often the only hope for salvation of these companies. Some cases are so far gone as to make even this impossible and absorption into larger systems is the only practical answer. Of course, those most intimately concerned and most badly hurt by the present situation are the present and potential telephone users located in these areas. The continuance of these problem cases is a stain on the industry and you as Independent operators, at least equally with Bell, cannot escape responsibility for working toward a solution.

Adjust Charges To Costs

A somewhat similar problem is that of delays in providing service, even by the companies financially able, to applicants in the outlying and sparsely-settled portions of exchange areas. I can understand your reluctance to spend $800, $1,000 or even more in new construction to pick up a customer seven or 10 miles out when others within the base rate area may be also waiting for service. But you have assumed the obligation of serving every applicant in your territory and the commission has authorized—I think in every instance — the construction charges you have requested.

Maybe a part of the answer is in a closer adjustment of construction charges to current cost levels. And while you are looking at this, maybe you will find it practicable to simplify, or eliminate, the costly instalment bookkeeping you are now doing. Perhaps you can also come up with an answer to the fellow who doesn't want service until someone else pays for a new line past his door, then complains bitterly about being required to share the construction cost.

EAS Demand

Another thing bothering us in the commission is that there seems to be considerable reluctance on the part of some Independents to move ahead with extended area service, particularly where it involves intercompany arrangements. I'm convinced that customers want extended local service in lieu of short-haul toll treatment over routes where there is high community of interest. I'm convinced also that, in order to obtain local calling privileges over these routes, the public is willing to pay the higher exchange service charges which the state-wide schedules specify for the larger station counts. Under these circumstances, there can be no excuse for failing to move ahead with extended area service offerings, wherever justified by the facts, as rapidly as possible.

Another thing, as you know, we at the commission have been troubled continually by incomplete and inaccurate reports from the smaller companies. Your association, largely through the efforts of Secretary Jack Hardy, has helped to improve this situation somewhat. Some of the smaller companies have also hired outside accountants. But, we could certainly stand a lot more improvement.

Of course, there is a lot more involved in some instances than just the matter of having nice pretty reports for us commission fellows to look over. I have seen cases where, in past years, smaller companies have charged to expense items they should have capitalized, then found when they approached us for a rate increase that they could not include this plant in figuring their rate base. These companies have hurt their chances for rate relief by failing to see the full importance of proper accounting practices and their effect upon rate situations.

Finally, you have by no means solved all of your service problems, even in the larger exchanges and the larger companies. I hate to bring this up on so pleasant an occasion, but we do have to face the fact that the commission still receives many complaints of service breakdowns which, in my view at least, are hardly explainable in this day and age. I appreciate that some of you have been experiencing growth pains and others have been absorbed with the more severe labor pains involved in giving birth to new systems. I would ask, though, whether growth and expansion — either internal or through consolidation — can be built solidly on any foundation except top grade service.

Let me give you one example from the commission files and I will tell you at the outset that I've chosen an extreme case to better illustrate the point. The company and the exchange in my example will be nameless. I do hope that not too many of you will identify this case as your own.

The case I have selected is that of an exchange of a thousand or so stations served by an Independent company with a modern dial system. For months now we at the commission have been receiving increasingly angry complaints—complaints of a wide variety of troubles from an increasing number of customers. Worst of all, many of these are repeat reports of the same difficulty by the same customer—cases where the plant people failed to find the cause of the trouble on earlier complaints and required three or four trips to clear the difficulty.

We have a file now at least an inch thick on this particular exchange. Over a recent four-month period, there were 428 complaints or an average of 3⅓ per day. Somehow everything seems to go wrong in this town. There are drop wire faults, instrument failures, inside wire faults, central office equipment failures, trunk overflows and overloaded free service line complaints (this one can be solved, of course, either by substitution of extended area or toll service). In addition there seem to be a goodly number of difficulties unintentionally caused by telephone people trying to repair the other troubles.

Two Doctors Involved

Individual customers have reported outages as many as 13 times in the past 15 months. The prize case, perhaps was that involving three doctors served from the same old cable who were cut off from service nightly because their cable pairs failed with the drops in temperature. What could you possibly do, I'd like to ask, to injure your public relations more than repeated service failures involving not one or two, but three medical men in a community this size? Aside from that, every repair call costs the company money and plant maintenance expenses can mushroom out of line fast when it takes repeated efforts to clear a single case of trouble.

This is an extreme example, of course, but I could cite quite a few others of lesser severity. What's the answer? How do you correct a situation of this kind?

I suppose that the first reaction all of us have is one of running out to take care of each trouble condition as it is reported. And, certainly, we have to do this. But isn't the problem much deeper? Isn't the real solution concerned rather with better long-range planning for every part of the operation—starting with management, going into engineering and on to construction, touching on employment standards and training methods, and, finally, concerning the day-to-day administration of the over-all job? From where I sit, I can't help but think that much of the activity throughout the telephone industry is short-term extemporizing rather than the kind of planning for the long-term which alone can pay off to the consumer in terms of efficient management, economic operation, and high quality service.

Here are some examples of what I mean: If your station forecasts are good and you have the courage, you will build your central offices for four or five years of growth, not one or two. In many cases, you will find 100-pair cables more economical than installing one 50-pair job today and a supplementary one tomorrow. You will step up preventive maintenance rather than wait for troubles to occur, knowing that pennies spent today mean dollars saved tomorrow. Similarly, you will hire and train people to meet your long-run requirements rather than grabbing one man off the street one day and another the next in a futile attempt to offset the backlog of held orders and service complaints piling up. If you proceed in this way, operating always for the long-term, I, for one, am convinced that over the long-pull all of us will benefit greatly—the telephone consumer most of all.

Takes Management Courage

Planning and operating for the long-run takes a good deal of management courage. And, I suspect, management courage goes up and down with the amount of elbow room in each company's earnings. For this kind of planning and operating costs more money today and tomorrow even though it eventually pays high dividends to users in terms of cost reductions and better service. And, more construction money isn't easy to obtain, especially in these days of tight money markets.

Obviously, as a staff man on the Illinois commission, I'm not in a position to make policy. But if I were managing one of your companies, I would be a lot more apt to make the larger financial commitments required for long-range installations if my earnings were a little above minimum level. On this basis, I would think that some margin of earnings above the minimum not only would be appropriate, but also would be in accord with the legal theory that management efficiencies, whether evidenced through effective long-range planning, new services, aggressive merchandising, or more economical operations merit regulatory reward.

New Methods, Service

Recently Pete Reno ran an excellent editorial in TELEPHONY concerning the Independent industry's 60th anniversary, which dwelled on some of these same matters. Toward the end he offered eight points on which he thought the Independent family should concentrate its efforts in the years that lie ahead. I'm going to mention only two:

(1) Adopting new methods and technical advances in the art.

(2) Offering a wider variety of new services which have been and will be developed.

As an engineer, I'm interested in technical progress of the telephone business. Some of the postwar developments in this field, on the part of both the Independent manufacturers and the Bell System, have been truly revolutionary. Here are just a few I picked out at random:

(1) New carrier systems with simplified controls and construction which enable easy addition of channels through factory packaged units.

(2) Subscriber carrier arrangements —a most important development— which enable you to serve more customers over existing leads without increasing physical circuits.

(3) Mechanization of accounting and customer billing, ranging from microfilming of toll tickets to the gigantic IBM electronic computer.

(4) A whole array of new types of station equipment and instrumentalities including the "hands-free" set, colored sets, the Ericofon bedroom set, electronic secretaries, aluminum outdoor booths and streamlined PBX's.

(5) Finally—and we are only beginning to visualize the possibilities on this one—the entire trend toward miniaturization in which transistors and other new developments will play such an important role.

There are many others and quite a few more still in the laboratory stage. And, it is well that this is so. For I don't think anyone can overemphasize the importance of technological progress to the telephone industry. First and foremost, progress is necessary to overcome the inherent tendency of your industry toward increasing unit costs as telephone systems grow and expand. Beyond that, the American public has come to expect continual change and improvement of service and product from all industry. Under either of these circumstances, you cannot afford to let up on new development effort. Fortunately, your Independent manufacturers—people like Stromberg-Carlson, North Electric, Automatic Electric, Leich, Kellogg and Federal are of sufficient size, competence, and stature to insure continued productive research and development activity.

The Independent telephone industry has done a good job in keeping pace with new technical developments. In addition, it has been a leader in promoting the increased use of telephone service through the sale of new and old items of equipment alike. Outstanding are items which we used to consider in the "luxury" field—things like color telephones, station signaling devices and, most important, additional residence extension telephones.

It took a long time for us regulatory people as well as you industry people to wake up to the fact that other American industries have not been satisfied with the sale of minimum service and products to their customers. We have seen the automobile manufacturers change their tune from a car for every family to two cars in every garage and the refrigerator manufacturers add a deep freeze to the conventional box. We have seen the refrigerator, washing machine, and automobile makers convert their products from drab whites and blacks to yellows, pastel blues, even indigos. Now at last the telephone business is out putting up a real fight to compete with all other industries in the battle to get an ever larger share of the consumers' dollars through new developments, sales and promotion.

I can see a direct parallel, by the way, between the two-car family and the two-telephone home, with all the telephoning done these days from residence telephones, especially by teenagers. I can remember my frustration not long ago in Cleveland, O. I was passing through by train and decided to take advantage of a short stop to call my sister to say hello. Now, her home is equipped with four extensions but only one line, and for 10 minutes all I heard was a continuous busy. One experience like this is all you need to decide a campaign to sell additional lines is urgently needed to eliminate the busy signal as the greatest bottleneck of our American system of communication.

Merchandising Is Key

The recent emphasis on "Merchandising," as you telephone people call it, is the key to your good performance so far. But there is still much to be done. Just to take one example, what non-utility industry can you cite that has anything corresponding to your backlogs of held orders for main station

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service, for better grades of telephone service or, for that matter, the gas industry's backlog of orders for house-heating service? You know we've all gotten quite callous about this and are almost inclined to treat it as a normal condition of the utility business. We ignore the fact that other industries, generally, got out of the shortage woods as far back as 1949 and have been beating the drums for expansion of their markets over the eight long years since.

One thing, I think, deserves stress. Again, I am in no position to make commission policy. It would seem unfortunate to me, however, if you in the telephone industry permit some of your rates to get far out of line with your costs, especially on items which you are merchandising. I appreciate, of course, that telephone rates have to be set generally on a value-of-service basis. But even in the value-of-service approach you should keep at least one eye constantly fixed on costs, both the specific costs associated with individual service and equipment items and general cost differences between classes of service.

Recently, we had a rather extreme example of rates which had gotten far out of line with costs. Illinois Bell first offered general mobile service back in 1951 and applied "experimental" rates which were inadequate from the start. Since that time the cost of this service has mounted greatly and the company has incurred significant losses on what might be termed a "fringe" or "luxury" type of service. The company filed equitable rates and interviewed all existing customers before going to hearing. There was no adverse reaction, most users agreed to the reasonableness of the new charges and a few customers even commented that the existing charges were, in effect, a "give away." The new rates were made effective last month.

Service Connection Charge

One of the things that I have been much concerned with personally is the generally low level of service connection, move and change charges throughout the state. It just doesn't seem to make sense to charge as little as $3.00 or $4.00 for a station installation, particularly when costs have gone up so much in recent years. Anyone knows that you've spent that much by the time an installer gets from the garage to the customer's premises, before he has done any work at all. If you don't believe it, see what your plumber or television man applies as a minimum charge for making a house call. Then compare his charge for the total job, computed by the hour, with the $3.00 or $4.00 you get on a fixed charge basis for jobs that may take a man a day or more. I remember one case, in fact, where two installers spent a day and one-half each going through concrete walls on a new installation because the lady of the house insisted on concealed wiring.

Along the same line, with your current emphasis on sales of color and residence extensions, I wonder whether your present charges for instrument changes and extension installations aren't so low that the costs of this work cut markedly into your profits from these sales. Of course, your change and service connection charge schedule can also be designed to have promotional effects. For example, you can encourage residence extension development and second lines by eliminating or reducing the charge for installing one

line or extension when it is put in simultaneously with another. This has the double advantage of promoting more service and eliminating the costs of making a second visit to the customer's home.

Other examples might be cited. One additional item which occurs to me is the existing rather narrow differential between station-to-station and person-to-person toll rates. With labor costs as high as they are and Direct Distance Dialing (DDD) coming into the picture on an increasing scale, I don't see how the telephone industry can afford to provide the added labor which goes into a person-to-person call under existing rate differentials. It seems to me that you provide a lot of complicated dial equipment at great cost to permit customers to dial their own calls, then tolerate a situation where much of the traffic still requires operator handling. Plain ordinary common sense seems to say that higher differentials for person-to-person service are in order both to cut down the proportion of traffic requiring operator handling and to get better coverage on the remainder of the high labor costs incurred.

Publicize All Rates

Of course, you have to prove in these changes to the commission — and of equal importance you must convince the public that they are reasonable. I do not mean by this that a big advertising and publicity campaign is in order. As a matter of fact I think that utility rate increases generally are overplayed in the press. Too often, also, you yourselves quote "average" increases rather than the dollar range of increases then find yourselves in trouble later with half the newspaper readers whose increases are above the published average.

You may remember that Chairman Perrine of our commission, in his recent talk before the Chicago Investment Analysts Society, drew a contrast between the differences in the press publicity given on the same day to a utility rate increase and a rise in the price of gasoline which cost the people 100 times more. It seems to me that you in the industry, as well as the press, need to quote your increases more understandably and develop a better perspective on the relatively minor impact of utility rate increases on the public by comparison with other price increases.

You know and I know that telephone, as well as gas, electric and rail services, have an importance to the social and economic well-being of Illinois which cannot possibly be measured in terms of rates 10 per cent, 20 per cent or even 30 per cent higher than at present. These services today are worth far more than they cost. Naturally, the commission is going to hold you to a legally fair return including, perhaps, a plus for management boldness and efficiency. In a way, you know, the whole matter of utility regulation is something like a baseball game. The legislature has laid down the rules, the supreme court is the high commissioner. Both the company and its opposition provide the professional talent. And, the commission's function is to call the balls and strikes, according to the rules, in the narrow zone between the batter's knees and shoulders.

Some time ago Chairman Perrine said: "No community is stronger economically or socially than the utilities that serve that community. If we hope to have the communities in which we live continue to expand in the way we here in America are accustomed, then it is the duty of these communities to take inventory of the utilities serving them and make sure the utilities have healthy financial structures." I can do no better than to close on that note.

Here's

D. O. HOOD, President of Columbia Utilities Company of Medford, Oregon, recommends Stromberg-Carlson XY toll ticketing.

COLUMBIA UTILITIES COMPANY

MEDFORD, OREGON

November 26, 1956

Stromberg-Carlson Company
Rochester, 3, N.Y.

Attn: J. D. Confeld
Senior Toll Ticketing Engineer

Dear Sirs:

Our Stromberg-Carlson XY VID automatic toll ticketing equipment was installed at our White City, Oregon exchange and toll center and cut into service on August 3, 1956. Since that time it has functioned exceptionally well, with a minimum of the "bugs" common to new equipment installations.

Our subscribers at the five dial exchanges equipped soon became quite proficient in dialing direct between these five exchanges, and to the Medford and Central Point exchanges of The Pacific Telephone and Telegraph Company (Bell System) stations. We have received relatively few complaints from subscribers affected by the new direct distance dialing innovation, and have been highly complimented by a great many subscribers.

We had reached the point where installation of an additional toll switchboard position was essential at the White City toll center. However, since installation of the toll ticketing equipment, such is no longer necessary, and we have been able to idle one of the existing positions. The effect is a saving of two full time shifts of operators, and at the same time an increased toll volume of around 25 %, and highly pleased subscribers.

Early next year we will expand our direct distance dialing areas to cover six additional Medford tributary exchanges. This should effect some further savings in operating costs, and some additional toll stimulation.

We are pleased therefore to recommend automatic toll ticketing to those companies who are able to "prove in" such operation.

Very truly yours

D. O. Hood
President

White City exchange of Columbia Utilities Company XY toll ticketing effected 25% increase in toll volume and cut costs for this West Coast independent.

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Proof of the Pudding

Oregon independent boosts toll volume 25%, cuts costs, with STROMBERG-CARLSON TOLL TICKETING

After only a few months of operation, Stromberg-Carlson toll ticketing paid off handsomely for Columbia Utilities Company at its White City exchange.

You will find—as did this Oregon independent—that XY® toll ticketing does a *complete job:* watches traffic automatically, clears recorders on a schedule basis, records data with equal ease on electric typewriter or cardpunching machine.

With our completely compatible equipment, which features flexible routing and rating facilities, you're ready to adapt to the nationwide toll dialing system.

To learn more about how XY toll ticketing will boost your profitable toll revenue, call or write the Stromberg-Carlson representative in your area.

The effect is...an increased toll volume of around 25%, and highly pleased subscribers.

Early next year we will expand our direct distance dialing areas to cover six additional Medford tributary exchanges. This should effect some further savings in operating costs, and some additional toll stimulation.

We are pleased therefore to recommend automatic toll ticketing to those companies who are able to "prove in" such operation.

Very truly yours,

President

S-C STROMBERG-CARLSON COMPANY

A DIVISION OF GENERAL DYNAMICS CORPORATION

Sales Offices: Atlanta 6, Chicago 6, Kansas City 8, Rochester 3, San Francisco

GD GENERAL DYNAMICS

THE Plant Man's Notebook

BY RAY BLAIN, TECHNICAL EDITORIAL DIRECTOR

ACCORDING TO THE *Engineer*, published by the Western Electric Co., a new method of thermally bonding polyethylene sleeves to the polyethylene insulation of wire, used in both toll and exchange area cable, has been developed at the Kearney plant. The resultant insulation splice, covering the brazed conductor joint, has water resistance and insulating properties compatible with those of the polyethylene wire insulation.

The older paper pulp wire insulation required wrapping the joint with electrical tape. However, the better insulating properties of polyethylene necessitated enclosing the joints with polyethylene sleeves, both ends of which would be sealed to the wire insulation. Originally, the seal was made by wrapping many turns of clear electrical self-bonding plastic tape around the splice, a tedious technique requiring considerable skill. An additional disadvantage was the bulkiness of the tape which was responsible for damage to the seals during subsequent operations.

The new method, taking only 15 seconds, uses an automatically controlled split mold to raise the polyethylene to its fusion temperature of approximately 250 degrees F. Application of 30,000 volts DC and 60-day water immersion tests have not damaged splices made by this technique.

It would seem that a similar method for insulating splices in polyethylene covered conductors in exchange and toll cable would prove highly desirable. There is no doubt someone will devise such a method in the near future that can be used in the field in order that pairs will not develop trouble even though the splice closure permits the entrance of water.

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We are in receipt of a most interesting letter from Rodney B. Cummings, of Philomath, Ore., in which he explains how they developed the new Telo-Cater parallel test set.

This set is designed to locate trouble on open wire lines without interrupting carrier systems that may be working over the physical circuits. Mr. Cummings states that they recently located a 350,000 ohm leak on a line that was traced to a wet protector.

It appears that this is a test set that will fill an important need for small telephone companies who are unable to keep a testboard man on duty in the office while the lineman chases trouble out on the line.

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The writer revisited the Smithsonian Telephone Exhibit here in Washington, D. C., recently to note what attention it was receiving. From every indication, it is evident that it is proving to be one of the most popular exhibits.

Strange as it may seem, the step-by-step dial system appeared to be receiving the greatest amount of attention. Visitors apparently enjoy dialing and watching the switch respond.

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Monotube steel poles up to 200 feet in length are now being used as whip type antenna supports without guys. These cold-rolled steel poles, tapering from a maximum of 18 inches, bottom diameter, to 3 inches at the top, present a trim, slender appearance unequaled by any other type of construction and at the same time assuring a permanent structure.

Heavy galvanized ⅝-inch diameter steel step bolts provide a safe climbing arrangement, and the diameter of the pole provides an easy attachment for the climber's safety belt. Steps are placed on 15-inch centers with three double opposite steps at the working top.

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Out in Los Angeles, recently, a 93-year-old man was arrested in a telephone booth while using a tiny instrument made of spring wire and safety pins to flip dimes out of the paystation slot.

The culprit pleaded innocent and argued that he was in the booth for the purpose of making a call to his mother.

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We are indebted to J. M. Taylor, vice president of the Whitney Blake Co., for a copy of what is believed to be the first telephone directory ever published.

It was issued by the New Haven (Conn.) District Telephone Co. on Feb. 21, 1878. It contains a total of 50 listings. It states that the office will be open from 6 a.m. to 2 a.m., and after Mar. 1, will be open all night.

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While visiting American Airlines' "Admiral's Club" at La Guardia Airport in New York City recently, we noted that the usual black key type telephones had been replaced with an ivory type. These new telephones are most attractive and blend well with the beautiful furnishings of the club.

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Color coding of outside distribution cable is now available. This coding has been under consideration for some time, and is now being adopted as standard by many of the operating companies.

Some engineers argue that color coding of this type of cable is not necessary, as a splicer can identify pairs by the use of a tone more quickly than by following the code. This is probably true on new work, but it is with cable throws and changes to provide additional facilities that the color coding is supposed to pay off.

A splicer can be dispatched to a certain point with a cut sheet to make a certain pair change. The change can be made by using the color code

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without the need of any testing. Actually, the color coding of outside plant distribution cable is a further "assist" to the one-man splicing crew.

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Columnist Bill Gold, in the Washington (D. C.) *Post and Times Herald*, claims that when Don Ameche invented the telephone he should have foreseen that teen-agers would claim it for their very own, and that their parents would seldom get a chance to use it. Unfortunately, he didn't, and nothing was done about Ameche's oversight until John W. Gibbons, of the Automotive Safety Foundation, came along.

This expert suggests that the telephone company ought to map a campaign to rescue its adult subscribers from the tyranny of their telephoning children. "Especially," as he puts it, "from the most maddening aspects of these marathon calls—those long periods of silence during which nothing is being said at either end of the line." This will not be easy. But, in his opinion, it is a project well worth the attention of the best brains of the industry.

Gibbons' idea is based on the use of a series of recorded announcements, played at predetermined intervals. Under this plan, at the end of five minutes, a gentle female voice could interrupt with a polite reminder that others may be waiting to use the line.

At ten minutes, perhaps a business-like male voice should be used. Preferably a voice that sounds like a husband trying real hard not to lose his patience. This might weed out some of the adult females engrossed in telling each other how much housework they have to do today.

After 15 minutes, one can assume that only teen-agers are left. Something a mite stronger is needed; perhaps a snatch of calypso—a catchy rhythm suggesting that they get off, get off, get offa that line.

At the 30-minute mark, loud rock and roll might be used, followed by a message employing whatever language the FCC will permit.

The 45-minute interruption is the crucial one. It is suggested that the recorded voice start reading the stock quotations for the day.

But to make the plan really work, it is proposed that the telephone receivers be wired with heating elements, like toasters. At the end of an hour, the instrument would begin to turn red. The teen-ager, forced to hang up at this point, would probably discover that his irate parent had turned purple some 50 minutes previous.

Plant Man's QUIZ

By RAY BLAIN, Technical Editorial Director

Q. We continually experience trouble caused from pay telephones being broken open and robbed when the stations are located in isolated areas. Will it be possible to provide an alarm system over the pair used to serve the telephone so that an extra circuit is not required?

A. A recently developed system is currently available which employs longitudinal transmission of a single frequency tone and is coupled to the line serving the telephone by means of a Simplex circuit.

This device will transmit the alarm signal over the line to the central office and in no way affect the normal telephone service. The signal transmitter could be concealed near the paystation and triggered so that the alarm will be transmitted when the thief tampers with the coin box.

The signal receiver may be located in the central office or the police station. The signal receiver detects the signal generated at the paystation and operates a relay.

This relay may be used to activate any type of alarm system desired.

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Q. We have not heard anything of late concerning the zoning of transmitters on telephones in common battery exchanges. Has this practice been discontinued?

A. Actually, the zoning of transmitters is not necessary when modern telephones are used. To make the modern telephone a full range instrument, usable anywhere without zoning, a fully automatic equalization feature has been included in the network.

This feature is, in effect, a "volume stabilizer" which permits the higher efficiencies to be effective when long loop conditions obtain, and successively reduces this gain as the loop is shortened. This equalization is entirely controlled by the amount of direct current received over the loop at any given subscriber station.

This feature does not require selection, zoning or adjustment at the time of installation.

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Q. We'd like to know what the Vincent Rare Gas Relay is and how is it used on telephone lines?

A. This relay consists of a small glass tube containing a special combination of rare inert gases acting in contact with special metal electrodes which permit current to pass above a closely pre-determined voltage.

The glass envelope is mounted in a heavy bakelite shell to provide mechanical protection. This complete unit is then mounted in a special holding clamp with the terminals of the relay brought out at convenient points for connections.

This device is designed for use on lines instead of mechanical type ringing relays. It may be used on either magneto or common battery lines. The regular condenser may be left connected in the bell circuit. It may be used with either harmonic or coded ringing.

Lines equipped with this relay are free from grounds in normal operation and, therefore, free from noise that would ordinarily be picked up through these grounds. This relay also prevents premature tripping in machine ringing from manual or dial offices.

•

Q. What method is recommended for removing nuts from bolts that are used to hold braces on crossarms? We have a number of these bolts to remove and have not been able to devise any effective means of accomplishing this except by cutting the heads off which is a slow and expensive method.

A. We suggest that you try a chemical rust cutter that is recommended for loosening ferrous nuts, bolts and other corroded hardware. This chemical is superior to penetrating oil because it is much faster acting.

A pressurized nozzle conducts the atomized mist into small crevices which otherwise could not be reached. This rust cutter can be procured from your telephone supply house.

XUM

How to smile

lethrough a rain of new customers

When new people start moving to your town in droves—that's when you're glad you bought Strowger Automatic! Strowger expansion is simple as 1-2-3:

HANDY EXTRA BANKS 1

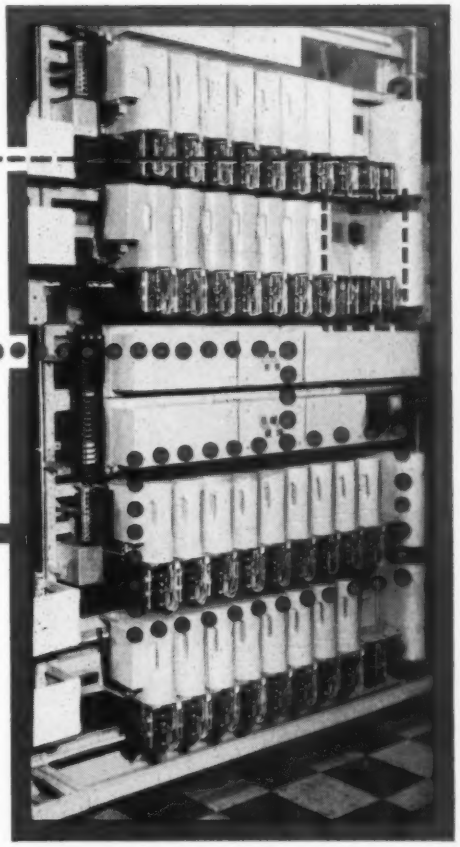
take care of moderate growth. Merely jack in another switch and you give a healthy boost to your traffic capacity.

PRE-WIRED SHELVES 2

handle larger expansion with a minimum of work and expense. All you do is slip them into place and connect a cable.

COMPLETE PRE-WIRED FRAMES 3

can be added to meet the largest growth requirements. There are no capacity limits to Strowger expansion.



BEFORE YOU INVEST, we suggest you pick out a few Strowger owners at random. Ask them precisely what expansion they've had, whether the job was easy, and what it cost. Get the facts and figures—convince yourself. Then contact your friendly Automatic representative. He'll be happy to give you further information—plus any engineering assistance you need. (A quote too, if you wish!)
Address: *Automatic Electric Sales Corporation,*
1033 W. Van Buren St., Chicago 7. Or call HAymarket 1-4300.

AUTOMATIC ELECTRIC

A member of the General Telephone System
One of America's great communications systems

GENERAL SYSTEM

Badgers Told To Prepare for Much Larger Expansion

By R. C. RENO

PROJECTING the gain in telephones by both Independent and Bell companies during the period from 1940 to 1957 for the next ten years, indicates that the future demand for telephone service will be greater than in any other past period in the history of the industry, H. G. Allen, president of the Wisconsin State Telephone Association told the association's annual convention, held May 15 and 16 in Madison. Mr. Allen is also president of the Northwest Telephone Co. of Tomah and a director of the United States Independent Telephone Association.

"Despite the phenomenal growth in telephone service since World War II, there is compelling evidence that we are on the threshhold of a still greater growth increase in telephone service," Mr. Allen said.

He pointed out that there are about 35 million single line telephones in today's homes (usually located in the entrance hall or living room), and by adding the extensions that can be installed in other rooms, it can be seen that the future market for telephone service is tremendous, Mr. Allen said. He further stated that, today, there are 10 million homes with no telephones, and about one million new homes are being built each year, also adding stimulus to the future market for telephone service.

In commenting upon the future demand for telephone service, Mr. Allen pointed out that perhaps present estimates could be as misleading as the economic forecasts made in 1946 and we might be faced with a greater service demand than is estimated today. In 1946, the census bureau forecast that by 1955 the population of the United States would be 150 million, but it turned out to be 167 million, an error of 17 million people—equivalent to the population of Canada. Likewise, Mr. Allen pointed out, in 1946 economists in the automobile field predicted that there would be 46 million motor vehicles in use by 1955. Actually, there were 52 million in service.

Mr. Allen stated that the tremendous economic surge we have been experiencing is not only a continuation of a postwar boom, but it is partly a result of an industrial revolution that has been going on in the United States during the past 50 years. He continued:

"In 1900, the greatest existing contrast was the immense distance between the rich and the poor, not only in income but in the way of living and the status of each in their communities.

"In 1900, the average annual wage of the 'middle income' industrial worker was around $500. Prior to the outbreak of World War II, the income of the typical 'middle income' family was approximately $1,500 annually. Today, that income has grown to between

Officers and directors of the Wisconsin Telephone Association. Standing, left to right: G. A. Rutenbeck of Milwaukee; E. L. Beyl of Osceola; H. P. Siebken of Madison; R. H. Keating of Wausaukee; Paul R. Parsons of Rhinelander; F. N. Willkomm of Lancaster; H. B. Flower of Wisconsin Rapids, and F. H. Schafer of Clintonville. Seated, left to right: Karl Mess Jr. of Phillips; R. S. Odegard of Menomonee Falls; G. F. Moser of Sharon; H. G. Allen of Tomah; Wyman W. Wiswell of Elkhorn; Ray J. Riordan of Madison, and L. J. Robertson of Platteville. Absent: when photo was taken were J. H. Hesselman of Mondovi; D. E. Peterson of Medford, and E. B. Samp of La Crosse.

XUM

$4,000 and $5,000 a year. This means that, at the present time, the average family in the 'middle income' class, taking into account the impact of income taxes and increased living costs, has about five times the discretionary spending power as the average prewar family.

"America has become more prosperous by making the poor less poor, and the result for our industry has been that thousands of families, previously unable to afford telephone service, are now in a position to demand and pay for our service."

Following Mr. Allen's address, the convention heard an interesting story of how a Cadott, Wis., attorney had received practically all of his high school education and all of his college and law education, through the use of the School-to-Home communications system, manufactured by Executone, Inc. of New York City. The School-to-Home service is provided over private telephone lines and most Bell companies and some Independent companies have introduced the service in their territories.

Attorney Frank Huettner, who has one of the largest law practices in the country, told his own story and expressed appreciation to the telephone industry for making it possible for him to continue his education after he suffered a major disability in an automobile accident when he was a sophomore in high school. He urged all telephone companies to consider providing the School-to-Home service to young people who are confined to their homes.

Mr. Huettner is preparing an exclusive article for TELEPHONY on his experience with the School-to-Home system, and it will appear in a near future issue.

In a frank appraisal and discussion of the federal Wage and Hour Law exemption for operators in telephone exchanges of less than 750 stations, Clyde McFarlin of Montezuma, Iowa, chairman of the USITA Employment Relations Committee, told the Wisconsin convention that the industry can not expect to keep the exemption forever. He warned that if it is eliminated, it would mean that many small manually operated exchanges would be forced out of business. He warned that all small exchanges must be converted to automatic operation, and that plans for such conversion should begin immediately. He said conversion is the only way to overcome the high labor cost should the operator exemption be lost.

Mr. McFarlin also urged small companies to consider consolidating with neighboring companies so that they can form a company with at least 1,000 stations. He frankly stated that he did not believe that it was possible for a telephone company—standing alone—to operate successfully with much less than 1,000 stations.

Photographed at the ladies' dinner preceding the Wisconsin convention were, left to right: Mrs. Wyman W. Wiswell of Elkhorn; Mrs. J. F. Benjamin of Cumberland and Mrs. Harris G. Allen of Milton.

Mr. McFarlin stated that, in his opinion, there is a bright future for small telephone companies if they will proceed with consolidations to form more economical units. He said there is still room in the Independent industry for such companies in spite of mergers of larger companies, and he recommended that the smaller companies proceed immediately to strengthen their positions.

Association Secretary Ray J. Riordon then presented his annual report.

He dealt principally with a bill that utilities are sponsoring in Wisconsin which would provide reimbursement for relocation of facilities along the proposed interstate road system. The bill was introduced in the state assembly on Apr. 17 and met opposition from the Wisconsin Highway Commission, American Automobile Association, automobile dealers, petroleum industry and the motor carriers. Severest criticism came from the highway commission which stated the measure would take 6 million dollars from highway funds, 10 per cent to be borne by the state.

Mr. Riordan referred to the figure as a "guesstimate" stating it amounted to $12,000 per mile, a cost he termed "ridiculous in view of an assertion by the highway commission, itself, that most of the interstate system in Wisconsin will follow new right-of-way where utility facilities will not be involved."

The secretary pointed out that the "grab of scarce highway funds," as the measure was tagged by the Wisconsin Division of the American Automobile Association, would serve to keep utility customers from contributing twice to

Discussion leaders of the commercial workshop held during the Wisconsin convention. Left to right: Karl Mohr of Northwest Telephone Co.; Don Busse of General Telephone Co. of Wisconsin, and K. J. Jackson, rates and research staff, Wisconsin Public Service Commission.

T. F. Miller of Milwaukee, member of the Badger Chapter Independent Telephone Pioneer Association, hands Miss E. M. Hiestand, at luncheon, a white gold watch as gift from the Badger Chapter in appreciation of her long service to the chapter.

the cost of highway construction, once in taxes and again in rates, and he explained that "even if we were to accept the highway commission's figure as 'gospel,' the amount taken from the Wisconsin highway budget would only be about a third of what that department spends for advertising annually."

As the convention met, Mr. Riordan reported, the bill was being subjected to review by the state's attorney general. Meanwhile, he urged Wisconsin telephone people to make every effort to give it the benefit of their support.

He said the telephone industry in the state had a proud record, was comprised of substantial citizens and in communities in which it operated it was most frequently the largest investor in the community's future. He cited the millions paid by the industry in taxes and concluded his remarks by saying "any industry that is responsible for funneling that kind of money into the government coffers should have no hesitancy about asking for legislation favorable to its customers, and the last source from which it should expect criticism is a state agency that wields one of the biggest shovels at the state's money pit."

In one of the most interesting features of the convention, E. J. Schaefer, customer relations representative of Wisconsin Telephone Co., gave a lecture-demonstration entitled "Dial F for Future."

Mr. Schaefer's demonstration is one that was designed to present to women audiences, describing the technical advancements in the telephone business. Mr. Schaefer noted that his company had found out that women of today are very much interested in electronic wonders. The program, "Dial F for Future," was created to acquaint women not only with the remarkable telephone marvels of today, but also to inspire their imaginations as to what the future of telephoning holds for the housewife of tomorrow.

E. J. Schaefer of the Wisconsin Telephone Company, presenting a lecture-demonstration entitled "Dial F For Future". He is displaying the new vista vision or television telephone recently developed in Bell Telephone Laboratories.

The last speaker of the general convention session was Guy S. Williams, contact manager, Veterans Administration for Wisconsin.

The final session of the convention the morning of May 16 was devoted to a plant workshop under the leadership of S. J. Kapitan of Dodge County Telephone Co., a commercial workshop lead by D. W. Busse, commercial supervisor of the General Telephone Co. of Wisconsin, and a traffic workshop under the chairmanship of J. F. Reding, traffic manager of General Telephone Co. of Wisconsin.

The annual meeting of the Badger Chapter of the Independent Telephone Pioneer Association, was held at a luncheon on May 15. The main speaker was the governor of Wisconsin, Vernon W. Thomson. During the meeting, T. F. Miller of Milwaukee, in behalf of the Pioneer chapter membership, presented a gold watch to Miss E. M. Hiestand of Madison, long-time secretary-treasurer and one of the organizers of the chapter, for her long service to the organization.

The following Wisconsin association directors were re-elected at the convention: H. B. Flower of Wisconsin Rapids; R. H. Keating of Wausaukee, and H. P. Siebken of Madison. New directors elected were: J. H. Hesselman of Mondovi and E. L. Beyl of Osceola.

Other directors are H. G. Allen of Tomah; F. H. Schafer of Clintonville; D. E. Peterson of Medford; G. A. Rutenbeck of Milwaukee; E. B. Samp of LaCrosse; L. J. Robertson of Platteville; Karl Mess of Phillips; G. F. Moser of Sharon; R. S. Odegard of Menominee Falls; Paul R. Parsons of Rhinelander; F. N. Willkomm of Lancaster, and W. W. Wiswell of Elkhorn.

This group, photographed at the pre-convention golf tournament at Madison, includes, left to right: William Evans and George Elder, staff members of the rates and research department, Wisconsin Public Service Commission; Donald Anklam, accountant, Rhinelander Telephone Co., and Allan Brown, President of the Rhinelander company.

The directors elected the following officers: President, Mr. Wiswell; vice president, Mr. Flower, and secretary-treasurer, R. J. Riordan.

Stand Up for Principles

"Let us not be content to wait and see what will happen but give us the determination to make the right things happen. While time is running out, save us from the patience which is akin to cowardice. Give us the courage to stand for something lest we fall for anything."—DR. PETER MARSHALL.

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THE Operator's Corner

By MAYME WORKMAN — TRAFFIC EDITOR

IT IS ALWAYS a pleasure to receive a note from a reader of *The Operator's Corner* stating it is enjoyed and helpful to operators and chief operators. Such a note was received recently from Jeanne Rush, Boone County Telephone Co., Harrison, Ark. Jeanne enclosed an article written by her chief operator, Mrs. Etta Poyner, for the girls in her exchange stating, "She doesn't know I'm sending it to you—but thought it was wonderful and it certainly is true, and I thought you would enjoy reading it."

I did enjoy reading it, Jeanne, and am reproducing it in *The Operator's Corner*. Won't your chief operator be surprised!

"WHY I AM A TELEPHONE OPERATOR"

"All of us who work for a living spend most of our working hours—or work days, at least, at our work, or going to or coming from it. If the job isn't an interesting one, we're likely to be unhappy people, no matter what the pay.

"That's where *we* have it over a great many people—telephone operating *is* an interesting job.

"We see a pretty representative cross-section of life as it flows across the telephone wires.

"Our daily contacts range from the child, just old enough to speak a number, and nearly too young to hear well over the telephone, to the person who has lived a lifetime and is unable to see the telephone number or hear on the telephone.

"Most of the calls we handle are routine, but any one may be a question of life or death.

"Our job is to handle each promptly, correctly, and with unfailing courtesy —to leave each customer with the feeling that his request is important to us and to the company.

"This requires mental alertness, and calls for resourcefulness in recognizing and dealing with unusual situations.

"We must always be on the lookout for the unexpected so we can think and act promptly to meet it competently—and it is this, perhaps more than any other one factor, which makes telephone operating so interesting."

It would be interesting to have an expression of opinion from many more operators and chief operators as to why they are telephone operators. Certainly Mrs. Poyner has given a fine viewpoint as to why *she* is a telephone operator, one that is probably shared by many chief operators and operators throughout the nation.

Once an operator has experienced the thrill of handling cords and keys and completing telephone calls, the experience will always be a pleasant memory long after she has established her final connection.

A short time ago I was privileged to be a guest at a luncheon and entertainment for retired life member women of the Bell pioneer association in Springfield. The luncheon was given in a beautiful room in the telephone exchange. The meal was served by the employes in the company's cafeteria and the food was excellent. Table decorations reflected the Easter spirit and were most attractive.

After enjoying the delicious food and a general round of interesting conversation, we engaged in a game of Bingo which had the distinction of having each participant receive a prize.

While I am a member of the Bell pioneer organization I am not in the category of a life member as I am still actively engaged in the telephone industry. So—I was happy to be an invited guest as it enabled me to fraternize with many of my former coworkers in the Springfield, Ill. exchange of the Bell company.

Before leaving the building, we visited the operating room which had grown tremendously since my last visit. En route to the operating, we chatted with girls on their rest period. One girl asked me how long I had been in telephone work. I told her it would be 50 years in a couple of weeks.

She looked me over and said, "I hope I can look that good 50 years from now!" She was further amazed to learn I am still actively engaged in the telephone industry.

I looked her over, too. She was young and vivacious, attractive, well groomed, a typical 1957 operator. Just the type of girl any chief operator would be happy to employ.

Some of the life members who had not visited the operating room for many years were greatly impressed with the new operating methods and equipment and one remarked, "I guess we were born 50 years too soon." I had to take issue with that.

It is true, telephone work today is highly mechanized and the service is the last word in perfection, but there was something about the service rendered years ago that brought the operator very close to her customers.

The service had a personal touch because in many instances the operator and the customer were acquainted with one another. There was a warm, human relationship and, because in many instances service was rendered the hard way, with old iron toll circuits which created transmission problems, long hours at the switchboard, little or no training methods, etc., it created a close bond between the chief operator and "her girls," because they were so dependent upon one another.

I believe the life members of today worked during one of the most interesting phases of the telephone industry. They are called "Pioneers," and they were just that—they paved the way for others to follow, God bless them!

Perhaps 50 years hence, the life members of that era will also be of the opinion *they* worked during the most interesting phase of the telephone industry. Who knows?

Traffic Questions

(1) On a Credit Card Call, should the names of the calling and called place be written in full?

(Please turn to page 52)

Courts and Commissions

Ohio Company Secures Permission to Finance

The Ohio Public Service Commission recently authorized the Kingsville Telephone Co. to issue 368 shares of its common capital stock with a par value of $50 per share, totaling $18,400, in exchange for its presently issued and outstanding 368 shares of common capital stock with the par value of $25 per share; also authorized the company to pay a stock dividend by the issuance of 1,840 shares of common capital stock with the par value of $50 per share, totaling $92,000, said shares to be issued, pro rata, among the present owners of the issued and outstanding shares of common stock.

Further, the company is transferring $101,200 from its earned surplus account to its common capital stock account, along with the right to sell for cash 1,500 shares of 6 per cent preferred stock with the par value of $50 per share, totaling the sum of $75,000, the proceeds of which shall be used to pay its presently outstanding indebtedness and to purchase additional equipment.

New York Companies Given Permission to Consolidate

The New York Public Service Commission on June 11 authorized consolidation of The Hilton Telephone Co. into Ogden Telephone Co. (TELEPHONY, Mar. 30., p. 44). Both companies have their headquarters at Spencerport. The Hilton company now serves about 1,600 stations; the present Ogden company serves about 2,700 stations.

In connection with the consolidation, the commission authorized the resulting corporation to issue $350,000 in first mortgage bonds to Berkshire Life Insurance Co., secured by a mortgage indenture to be issued to Genesee Valley Union Trust Co. as trustee.

The company is also authorized to issue 800 shares of five per cent cumulative $100 par value preferred stock and to issue 7,900 shares of no par value common stock. Of the latter, 3,110 shares are to be exchanged for a like number of existing shares of Ogden Telephone stock and 1,500 will be exchanged for a like number of outstanding shares of the Hilton company. The balance of 3,290 shares will be offered at $35 a share with existing stockholders of the two companies having pre-emptive rights to purchase three new shares for each four shares they now hold in either company.

Proceeds from the new financing are to be used to discharge outstanding short-term obligations of the two companies and to defray costs of the consolidation and the issuance of new securities. The balance is to be earmarked to finance construction work undertaken or completed after the consolidation.

In a report to the commission, Examiner Thomas J. Brady states that "although the management does not claim there will be any substantial savings in operating expenses as the result thereof, the consolidation should facilitate future financing operations, billing and accounting."

Nebraska Companies Ask To Purchase, Raise Rates

In a hearing on June 10, the Rodeo Telephone Membership Corp., Burwell, asked the Nebraska Railway Commission's permission to purchase the property of the Scotia Independent Telephone Co. (TELEPHONY, April 20, p. 36).

On June 11 and 12 the commission heard applications to increase rates by the Skeedee Independent Telephone Co., St. Edward, and the Northeastern Telephone Co., Elgin.

N. Y. Company Asks to Sell

The New York Public Service Commission on June 20 was scheduled to hear the petition of the Schoharie Telephone Exchange Inc. to sell to the Middleburgh Telephone Co.

Wis. Company Asks Raise

The Wisconsin Public Service Commission on June 18 was to hear the application of the Buffalo County Telephone Co. for permission to increase rates.

Orders Fine in Kentucky's "Reasonable Service" Trial

A jury in Rockcastle Circuit Court on June 8 convicted the manager of the Mount Vernon (Ky.) Telephone Co. on a charge of failure to render adequate service, it was reported. A $500 fine was levied.

Counsel for Frank Dees, the telephone company official, filed notice of appeal.

The charge was brought under a state law requiring a public utility to render reasonable service, the trial being the first of its kind in Kentucky.

The indictment charged failure to provide efficient, adequate and reasonable service the past year. The charge carries penalties upon conviction of one cent to $1000 in fines and one day to six months jail term or both.

Dees testified the company was giving the best service it could. He said a 1950 city resolution passed on to the public service commission prevented him from installing an automatic system. He said the automatic system would end the trouble on exchange service.

His attorney, Calvert Little, London, in final argument, asked the jury to consider if Dees willfully failed to provide service or if he had done the best he could under the opposition he encountered.

The state's attorney, Russel Jones, in summing up his case for the jury, contended Dees had blocked progress in Rockcastle County.

The prosecution introduced witnesses who testified about difficulty in raising the operator.

Minn. Purchase Authorized

The Minnesota Railroad & Warehouse Commission on June 10 authorized the Arvig Telephone Co., Pequot Lakes, to purchase the entire properties of the Backus Telephone Co. The Arvig company also recently purchased the Hackensack Telephone Co. (In TELE-

PHONY, June 8, p. 39, it was inadvertently stated that the Hackensack company purchased the Arvig company).

Tennessee Independents Gain Toll Rate Increase

Two Independent telephone companies were granted increased intrastate long-distance rates on May 21 by the Tennessee Public Service Commission (TELEPHONY, June 15, p. 40).

The increase is retroactive to May 3 to conform with that granted temporarily to Southern Bell Telephone Co., pending disposition of the rate case before the state supreme court.

Southern Continental Telephone Co., of Cookeville posted a $10,000 bond and Inter-Mountain of Bristol posted $25,000 to cover possible refunds.

Northwest Telephone Co. Gets OK on Financing

The Public Utility Commissioner of Oregon on June 11 authorized the Northwest Telephone Co. to issue and sell on or before Dec. 31, 7,200 shares of its $5 par value common stock at a price of $16 per share.

The company will use the proceeds for retirement of accounts payable, reimburse its treasury for money expended on plant additions, and for construction and improvement of operating facilities.

Authorizes Merger of New York Independents

A merger of the Hilton Telephone Co. into the Ogden Telephone Co. was authorized by the New York State Public Service Commission, it was reported on June 14 (TELEPHONY, Mar. 30, p. 44).

Both companies now have headquarters in Spencerport. The Hilton company serves 1,600 telephones from Lake Ontario south to the Ogden company's territory. The latter serves about 2,700 telephones around Spencerport and south to North Chili.

N. C. Independent Seeks to Issue $40,000 Preferred

The Sandhill Telephone Co. of Aberdeen asked the North Carolina Utilities Commission on June 13 for permission to issue up to $40,000 worth of cumulative preferred stock at a par value of $10 per charge with an annual dividend rate of interest at 5½ per cent.

The company said additional funds are needed for the purchase of equipment and supplies to serve the Wagram and Aberdeen areas.

Denies Kansas Company's Plea to Cease Operating

Irving (Kan.) Telephone Co. has lost another round in its attempt to cease service in that area because the Tuttle Creek reservoir will inundate property of many patrons (TELEPHONY, May 18, p. 38). The Kansas Corporation Commission denied a rehearing of the case. The commission recently told the telephone company it must continue operating for an indefinite period of time.

R. J. Maxwell Named Manager of Ohio Company

Raymond J. Maxwell has been appointed as general manager of the Mansfield Telephone Co., succeeding Marvin A. Byrd, who has been appointed sales manager of the United States Instrument Corp. (TELEPHONY, May 25, p. 48).

In addition to his new duties, Mr. Maxwell will continue to serve as secretary and treasurer of the company. He joined the Mansfield Telephone Co. in December, 1931.

To Offer Mobile Service

The West Coast Telephone Co. of Everett, Wash., is planning to offer mobile telephone service to subscribers in its Coos Bay-North Bend territory.

One Man
Working Alone
Can Identify
Non-Working
Cable Pairs
3 Times Faster
Than 2 Men
Working Together
If He Uses
The Murphy
ONE-MAN
Cable Tester

MURPHY
One-Man Cable Tester

SAVE time . . . money . . . manpower with Murphy One-Man Cable Tester. Thousands are already in use by progressive telephone companies all over the world.

MANY NEW PRODUCTS IN DEVELOPMENT STAGE

Murphy Engineering Laboratories are working on a wide variety of new products that will help you save vital manhours. If you would like to keep informed about these products send your name and address to our office and we'll put you on our mailing list.

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shop talk

Pat: Know how many ladies can read the Bell System ad we're in?

Peg: How many?

Pat: 18,700,000 no less! In nine leading women's magazines!

Peg: It figures. Because everybody should learn how handy it is to have telephones in the right places in the home.

Pat: All those people . . . all over the country . . . !

Peg: That's why I think we help the sales of *all* of America's telephone companies.

Pat: Gee! This calls for a second cup!

You can read what Pat and Peg have to say about telephone convenience in current issues of these magazines:

McCall's • Parents' • Family Circle • Woman's Day • Better Homes and Gardens
Good Housekeeping • American Home • Household • Ladies' Home Journal

***Adult women reached:* 18,728,000**

Working together to bring people together
BELL TELEPHONE SYSTEM

XUM

construction and maintenance DIGEST

- **Country-style thrift**
- **25-year battery**
- **Weather-scoffer**
- **A lasting wire**

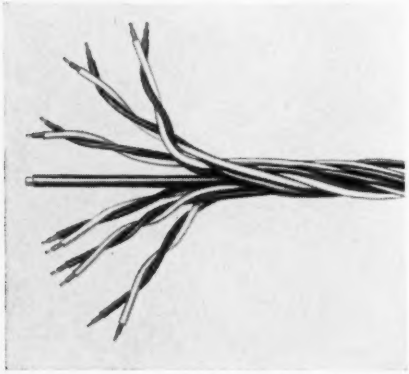
Published regularly to help you get the most out of your materials and supplies dollar

by Gerald C. Gaydos, Inside Sales—Chicago

In my spare time I like to do crossword puzzles, but there's never any puzzle about the advantages of ordering supplies from Stromberg-Carlson. No matter where you're located, you're protected by a double guarantee on the fine products you order from Stromberg-Carlson . . . ours, and the maker's. This way, when emergencies make special demands—you're not alone. You find **two** solid companies right beside you, eager to help. That's how our 62-year reputation in the industry has grown. That's why it pays you to order from Stromberg-Carlson—leader in the research for new and better telephone equipment. We'd like you to know we appreciate your support.

Rural Distribution Wire Gives Speed Plus Economy

For fast, low cost construction specify Ansonia Lightweight Rural Distribution Wire.



Ankoseal Rural Distribution Wire Ideal for Temporary Service or Cable Relief

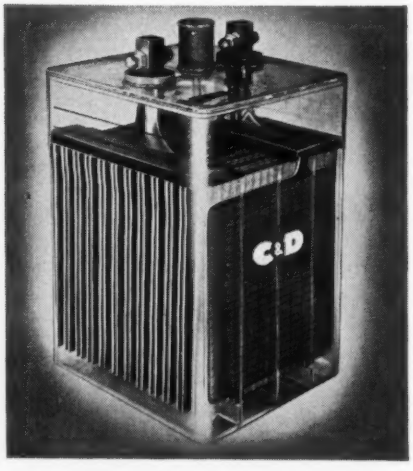
It comes with plastic-insulated #19 A. W. G. soft copper conductors in color-coded parts, which are cabled around a polyethylene-insulated .109 high strength galvanized steel support wire. Each conductor pair has a controlled different length twist to avoid crosstalk.

A breaking strength of 1800 pounds makes this Ansonia Wire & Cable Company product ideal for temporary service or cable relief.

Battery will still have its pep when 1982 rolls around

It will last 25 years—in full float service! That's the life expectancy of C & D's PlastiCal (lead-calcium grids) telephone battery.

You get this extra-long, trouble-free operation because C & D Batteries, Inc. use an exclusive suspended and supported plate construction.



In full float service, this telephone battery stays on the job a quarter of a century.

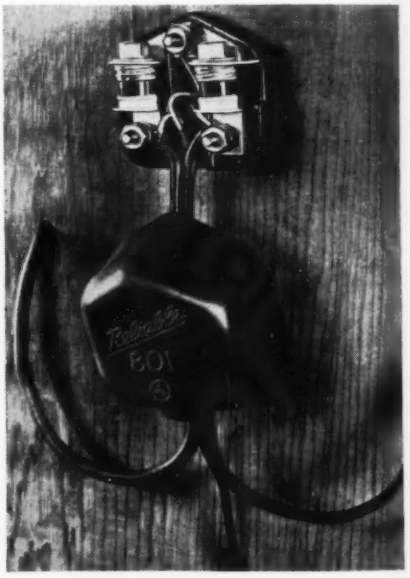
Illustrated here is a typical C & D telephone battery with a 660 A.H. capacity. When ordering this 25-year battery, specify PCE-660.

When you find that a 14-year expectancy meets your needs, you can get dependable operation from a C & D PlastiCell (high-tensile lead alloy grids) battery. For a PlastiCell with capacity of 660 A.H., specify CE-23.

You can order either of these C & D telephone batteries, plus other capacities, from your Stromberg-Carlson representative. Ask him about extra-long-life power supply with C & D Batteries.

Long life under all conditions

You get long service life under all kinds of weather conditions with the Series 800 Fuseless Protector, recently developed by Reliable Electric Company.



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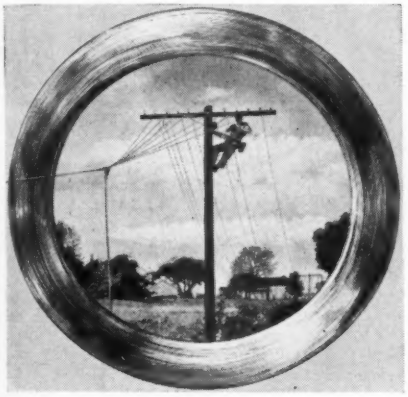

Copperweld Line Wire "talks better," and cuts your maintenance costs.

For short subscriber loops and secondary toll lines, we recommend .080"-30 E.H.S. and for toll lines and long subscriber loops, .104"-40 H.S.

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General of Cal. Aids Polio Rehabilitation Project

To assist in the rehabilitation of some 500 crippled Californians, victims of poliomyelitis at the Rancho Los Amigos Hospital in Hondo, General Telephone Co. of California recently contributed an authentic switchboard. Equipped with power to energize the visual and audible signals, the board will be used by patients of the hospital as an additional therapeutic tool in their goal toward well-coordinated and useful lives.

Through the efforts of Dr. Leonard Wendland, clinical psychologist and head of the hospital's psychology and vocational services, the pre-vocational testing clinic was founded less than a year ago as another medium for turning disheartened victims of poliomyelitis into productive and useful citizens ready for employment upon their discharge from the hospital.

The pre-vocational testing clinic is the brain child of Dr. Wendland, and his enthusiasm for the project knows no bounds. Aside from the telephone switchboard, he has acquired typewriters, calculators and adding machines, also electronic apparatus such as old radios which can be worked on by patients who show a desire and aptitude for this type of work. The clinic includes a machine shop with a lathe, drill press, band saw and sanders. Other work situations will be developed in the future.

It is Dr. Wendland's idea to make time and motion studies while the patients are actually operating the various machines, to determine the progress of their coordination and to establish whether they have the continued strength to adequately compete with the working world. Polio usually leaves the patient with a variety of orthopedic and respiratory disabilities, frequently resulting in the need for vocational changes and specialized work placement.

Such questions as: "Can a polio patient be put on a competitive basis for an eight hour stretch or is he limited to a shorter period of time?" are being answered through the studies made by Dr. Wendland's staff, which includes: Charlotte Steitz, occupational therapist, who specializes in upper extremity assistive devices and is able to evaluate work involvement; Dr. Roy Dunlap, industrial psychologist who is doing research at the clinic to determine basic

The accent on rehabilitation has become the keynote of the pre-vocational testing clinic, located within the Rancho Los Amigos Hospital in Hondo, Calif., where 500 victims of poliomyelitis are being restored to useful lives through the efforts of the clinic. Here we see Bernice Breitman, patient (seated), operating the newly acquired telephone switchboard, gift of the General Telephone Co., while (left to right), Dr. Leonard Wendland, clinical psychologist and head of the hospital's psychology and vocational services; Chuck Addy, commercial representative for General Telephone Co. and Charlotte Steitz, occupational therapist, look on.

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vocational areas in which the physically handicapped can most likely function, and Russell Forney, vocational psychologist who works closely with Miss Steitz.

Although financed by a grant from the Federal Office of Vocational Rehabilitation, the clinic can only begin to provide some of the tools necessary to reorient victims of this disease; therefore, when organizations like General Telephone Co. provide tangible aids that promise a fuller life for the handicapped, they are assuming the community's responsibilities by helping these people to become self-sufficient rather than a burden to their community later on.

"Organizations which hire polio victims who have attended the pre-vocational testing clinic," says Dr. Wendland, "will find them to be not only grateful and efficient employes, but reliable and loyal to their jobs."

It is Dr. Wendland's hope that the clinic will develop a closer liaison with employers so that it can assist those patients who require special placement to find mutually satisfying employment.

To keep the program realistic, the clinic welcomes industrialists and employers who will visit and give their advice on patient rehabilitation.

Army's Helmet Radio Tiny Solar Batteries Power

The helmet-radio being developed by the Army may soon need only exposure to sunlight to obtain all the electrical power necessary to operate both its transmitter and receiver for as long as a year, it was announced by the Department of the Army on June 8 *(See cover cut)*.

Experiments at the U. S. Army Signal Engineering Laboratories, Fort Monmouth, N. J., prove that solar batteries, which convert light to electricity, can power the world's smallest transmitter-receiver. This helmet-housed radio is nearing final design at the Laboratories.

The experiments have been so promising that similar power is now under serious consideration for the walkie-talkie and other light field radios.

Long, narrow clusters of tiny solar cells are placed on either side of the crown of the helmet. These silicon wafers power the radio for normal daylight operation. They also charge four small nickel-cadmium storage batteries to supply peak current in daytime and to operate the set at night.

Use of the solar cells in combination with rechargeable nickel-cadmium batteries would provide power for many months, possibly a year or more. With the dry cells now used in the helmet-radio, battery life is less than a day if used continuously.

Army Signal Corps engineers at the U. S. Army Signal Engineering Laboratories working on the solar helmet faced several formidable technical problems. Although comparatively short-lived, the dry batteries presently providing electricity easily furnished the 50 volts required by the radio's final stage transmission tube as well as the much smaller needs of the transistors used elsewhere in both the transmitter and receiver.

But solar cells with enough surface to supply 50 volts would more than cover the helmet. So it was necessary to design a power converter that would raise the approximately 4.5 volts of the solar-nickel-cadmium battery combination to 50 volts.

Careful design produced a completely transistorized converter small enough to fit, with the nickel-cadmium cells, in the aluminum housing already used for the helmet-radio's dry batteries.

Even with the solar batteries, power converter and nickel-cadmium cells the sun-powered version of the radio is as light as the dry-battery powered set, which weighs slightly less than a pound.

Work on the solar conversion of the helmet-radio was done in the Power Engineering Branch of the U. S. Army Signal Engineering Laboratories' Power Sources Division, under the direction of George Hunrath. George Uchrin of the same branch designed and built the power converter.

Obituaries

HERMAN LUEDERS, 81, died on May 30 in Norwood, Minn., following a three-month illness.

Mr. Lueders had managed the Carver County Telephone Co. from 1908 until his retirement in 1949. He was a charter member of the Minnesota Telephone Association and had served as its vice president and on the board of directors.

•

H. H. THOMPSON, 52, died suddenly on June 8 at Morristown, Minn., where he was owner and manager of the Morristown Telephone Co.

He is survived by his wife, Alice M. Thompson.

One's Attitude Important

"Every man has his chain and clog, only it is looser and lighter to one than to another; and he is more at ease who takes it up and carries it than he who drags it."—SENECA.

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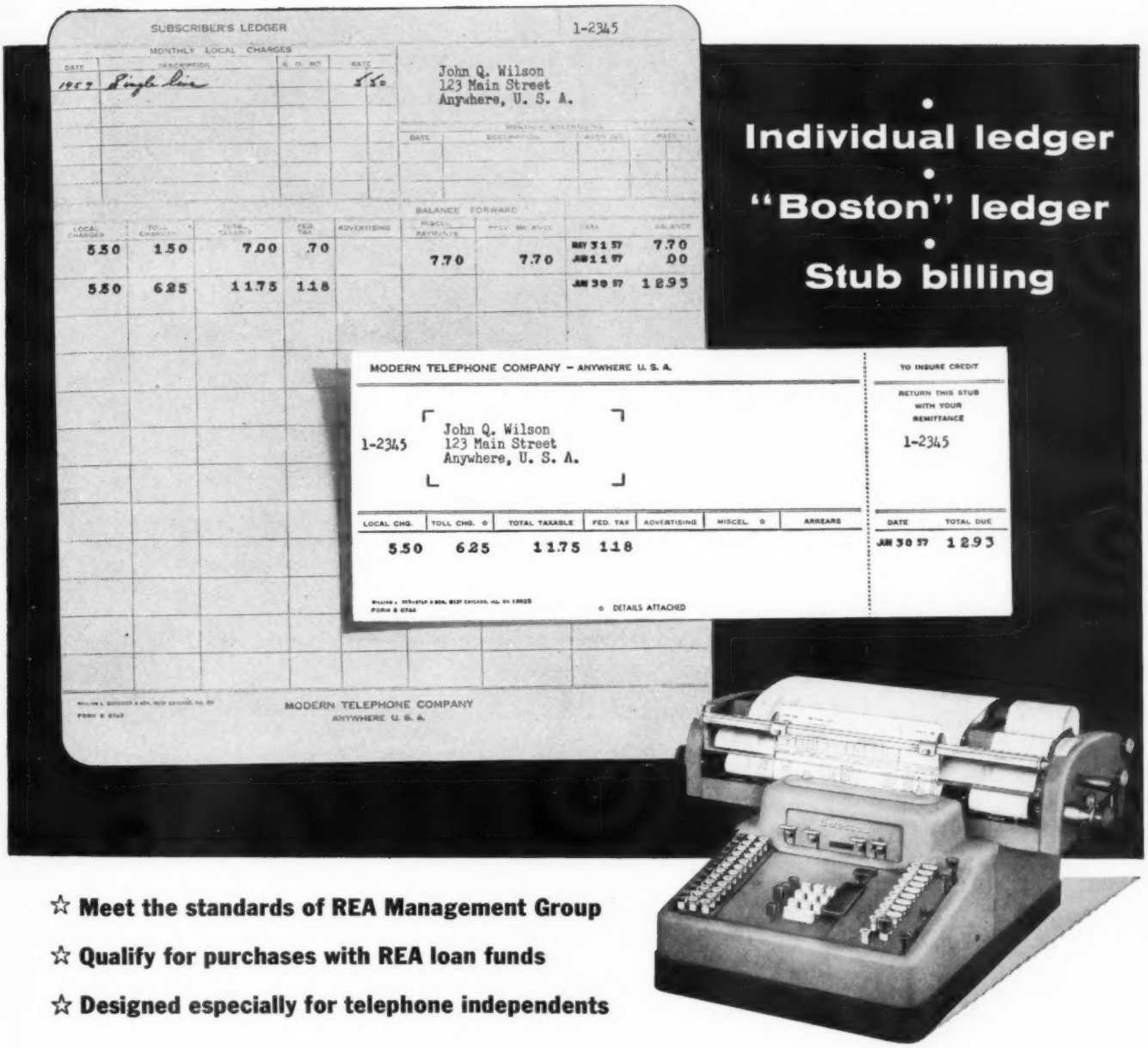
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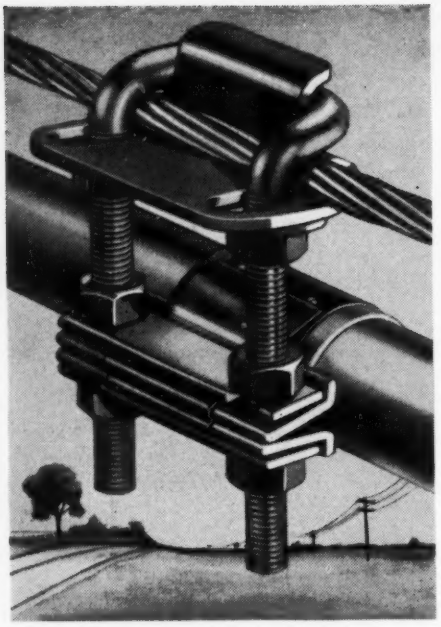

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IN THE NATION'S CAPITAL

Continued from page 20

that commission really wants to fix reasonable rates, on a basis of equity and justice, or merely to limit telephone company return to what barely escapes confiscation. That brings up the Hope case, which is usually cited as an authority for keeping utility rates screwed down to the last turn of practical operating profit.

We hear a lot of talk and confused thinking about what the U. S. Supreme Court said in the Hope Natural Gas Case in 1944. To hear some people tell it, Justice Douglas' opinion in that case forbids the use of present fair value as a rate base. It did no such thing. To hear other people talk, the Hope case permits state commissions to use any kind of a rate base method they please, as long as the utility company is still able to keep going and raise enough capital to stay in business.

Never Involved State Law

That second view is at least arguable because that is about what Justice Douglas said, although why he said it in this case I never could understand. The Hope Natural Gas decision did not involve state commission rate-fixing at all. It involved the Federal Power Commission. It did not involve state law. It involved the Natural Gas Act.

The only question properly before the court was the reasonableness of rates fixed by the federal commission under the federal statute. And anything said by Douglas and any of the other justices (and they all said plenty) about any test of confiscation with respect to utility rate-making by state commissions was, to my mind, what the lawyers call *obiter dictum*. This is a fancy way of saying that Douglas was articulating through his judicial chapeau.

But, for practical people in the telephone and other utility business, it was only natural that they should pay attention to the view expressed in that opinion. This was to the effect that no state commission rate should ever be thrown out or set aside as confiscatory under the U. S. Constitution by a federal court simply because of the method of rate-making used. And, we have got to face up to the fact that the court has followed that view ever since. So, we have got to assume that that is the law as far the U. S. Supreme Court and the Constitution are concerned.

Now, where does that leave us? It simply means that as far as confiscation is concerned, without any reference to the reasonableness of rates under state law—but simply as to *confiscation* under the federal Constitution—the U. S. Supreme Court is not going to interfere, whether a state commission fixes rates on an original cost basis or any other kind of basis. That is all the Hope case means. Those who say that the Hope case is any authority against present fair value in state regulatory law, as a test of a reasonable rate, have not read all four opinions in that case carefully.

That brings us back to your problem here in New York State. I would like to repeat that there is a vast difference, a moral difference between what is a confiscatory rate and what is a reasonable rate.

Your present statute states that the commission shall fix a "reasonable rate" with due regard to replacement value. The test of confiscation is merely the "bad man's" theory of the law. It is the point beyond which the federal government might have to step in to prevent a state from picking the pockets of its citizens or taking property away from them without just compensation. It is the limit that state regulation can get away with oppressing utilities and still stay within the letter of the law.

The test of *reasonableness*, on the other hand, is a moral test. It is the "good man's" theory of the law. It is the test of the good neighbor, or golden rule. It means that commissions should protect the utility investors as well as the utility customers to the end result that the investors will continue to invest.

Future Customers Hurt

It is no answer to say that because replacements are constantly being made in modern utility operations, and that because these replacements go into the rate base at higher cost figures, the investors will eventually get their money back on the higher earnings.

The point of simple justice is that those customers, in the service of whom the actual property investment was used up or worn out, are not paying for it. Future customers will pay for the replacements; and after that, more customers, still further in the future, will have to pay still more for replacements not used for their service.

Under inflation this cycle goes on and on—with the investor never catching up—and the whole process of rate regulation becomes a sort of a check-kiting operation.

No one would presume to say that any use of an original cost base is wrong. But, common sense tells us that when prices rise high enough or

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fast enough, due to inflation, there is a point at which this approach, which not only ignores value but absolutely refuses even to accept or listen to any evidence of value, becomes no longer the honest thing to do.

In other words, when a cost base is used in such a way that the investor is deprived by law of a fair return on the value of his investment he is getting gypped. In periods of relative monetary stability, the use of a cost base may give approximately honest workable results over a considerable length of time.

But, obviously, where inflation has destroyed half the purchasing power of the dollar in little more than a decade, it is only simple justice to give the utility investor at least the same kind of a break as the tax assessor or the used car dealer.

What is reasonable treatment of the investor? I can only generalize here, of course. But I would say that in addition to paying off all honest operating expenses, the utility investor is entitled to a rate that will do three things.

First, it ought to cover interest on debt because that is the cost of money hired or borrowed to build the plant needed for public service.

Second, it ought to pay a dividend on common or equity stock equal to what is necessary to attract capital to keep the plant expanding.

Third, and here is where the value concept comes in, the rate ought to enable the company to set something aside for surplus, to improve the equity position of the utility owners.

If regulation fails to do this, utility share owners are forever deprived of any opportunity to share in any future growth or expansion of the business. Their position is worse than the bondholding because they do not have the mortgage security or interest contract of the bondholder.

Smacks of Subterfuge

It is possible, of course, to take care of all these things, even the contribution to surplus by simply raising the rate of return on a cost base. But, how many commissions would be willing to raise it that high. And is it not the honest way (to recognize increasing value) to admit that it exists in the *property* rate base. That is where it is, if it exists at all. Surely that is more consistent than pretending that it does not exist, by continuing to use an outmoded cost base, and then trying to compensate for price inflation by monkeying with the rate of return. Such a regulatory device smacks of subterfuge.

You will notice I have continually referred to utility companies not just telephone companies in this discussion. I know that this legislative controversy in New York State affects only the telephone and railway companies. But, as far as fairness and integrity are concerned, I do not see why the same rules should not be applied to the gas and electric utilities. I know a good argument can be made for some kind of a distinction on the basis of higher payroll and other expense ratios which the telephone companies have, compared with the other utilities.

But, that only means that inflation hits the telephone companies harder and sooner than it does the others. Eventually, it will catch up with the others and hit them just as hard when they have to make large capital plant commitments.

Finally, I hope that nothing I have said today will give you the impression that I do not think that utility regulation is working out, or that the commissions, generally, are not doing a fine job. They are. Utility regulation in America is a magnificent success because of the obvious fact that we have, here, the best service in the world, patronized by a higher percentage of the common people than anywhere else in the world. Fifty-eight per cent of all the telephones in the world, right here in the United States, speaks for itself. Commission regulation, as well as the efficiency and know-how of the utility businesses, speak for themselves on this.

It is only in the minds of unfair critics that commission regulation has failed or is not doing a job. I refer to our own Socialists, who, Mr. Khrushchev says, will some day convert all of our grandchildren. Our Socialists say that regulation has failed, because they *want* it to fail and they will then get their way by default, as happened in France.

But, regulation will continue to be a success only as long as it remains on a just basis, dealing fairly with the investor and customer alike. Our regulation could fail if it fails the consumer. It could also fail if it fails the investor. And that is why I say that there are no sides to regulation. There is only one proper concept of it —the public interest. It must be kept on that basis by just laws and honest practice, which recognize living values, or at least a reasonable facsimile.

Hidden Opportunities

"The block of granite which is an obstacle in the pathway of the weak, becomes a stepping-stone in the pathway of the strong."—CARLYLE.

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Write for Bulletin 4B4

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USITA and Bell Report on EAS Directories, Aircraft Messages

THE United States Independent Telephone Association on June 12 released joint reports of its Toll Compensation and Settlements Committee and Bell System representatives relating to (1) recommended Extended Area Service (EAS) directory arrangements between Independent and Bell companies, and (2) a settlement plan for aircraft flash messages recommended for consideration by Independent and Bell companies.

Following is the full text of the joint report on EAS directory arrangements between Bell and Independent companies:

Recommendations covering Extended Area Service directory arrangements have been jointly agreed upon by representatives of the United States Independent Telephone Association and the Bell System.

Attached is an outline of the recommendations submitted by the industry representatives to their constituents for their consideration.

It is recognized that the choice of a plan to be adopted will be dependent upon local conditions and will need to be determined through discussion by the companies directly involved.

* * *

Extended Area Service Directory Arrangements Between Bell and Independent Companies

In determining directory arrangements for Extended Area Service, each case is considered as to a plan which is best for the community or communities and directory users from the standpoint of the users and over-all service.

In each case, the final arrangements are determined through discussion by the interested companies involved including directory representatives. Usually one of the following basic plans is adopted:

(1) Each company compiles and prints its own directory, either by contract or by using its own resources, including alphabetical listings of its own subscribers only.

Each company sells its own "local" and "foreign" directory advertising—unless otherwise mutually agreed upon.

Customers are given a directory for their own community and directories for other communities according to the actual requirements. Each company purchases from the other the directories needed to meet its customers' demand.

(2) Each company compiles and prints its own directory, either by contract or by using its own resources, including alphabetical listings for the entire extended service area.

Each company sells its own "local" and "foreign" directory advertising—unless otherwise mutually agreed upon.

Where it has been agreed to use a common list, each company furnishes to the other a list of its subscribers or some other notification at no charge.

Where it has been agreed to use lists arranged by town headings, the required alphabetical sections may be purchased from the other company on an overrun or some other reasonable price basis.

(3) One company publishes the directory including the classified and alphabetical sections of the entire extended service area. The company publishing the directory sells directory advertising throughout the extended service area. The other company bills and collects for all advertising sold within its serving area, retaining the directory advertising revenue and paying to the publishing company an agreed upon per cent* of this revenue for selling the advertising. The pro rata cost for printing, compiling and furnishing copies of the directories is paid by the other company. Normally each company uses its own directory cover.

*The size of this percentage depends on a variety of factors, such as the advertising sold, etc.

Choice of the plan to be adopted—one of the three above or appropriate modifications—would depend upon the economics, publishing problems (closing dates, columns per page, uniformity of listings) and other factors of local significance in each individual case.

The text of the joint report on "a settlement plan for aircraft messages" follows:

The Air Force has requested that billing for aircraft flash messages be consolidated and billed by the Bell companies in each of a number of filter center locations. This results in the handling of aircraft flash calls on a special basis.

A plan for settlement between Bell and Independent companies for aircraft flash messages originating in an Independent company exchange and terminating in a Bell operated filter center has been agreed upon by representatives of the United States Independent Telephone Association and the Bell System.

Attached is a copy of the plan which is recommended by the industry representatives to their constituents for their consideration.

This plan is basically the same as that presently followed by Bell and Independent companies except that it provides an arrangement whereby the Independent company doing the toll operating may prepare a toll statement for the aircraft flash messages if it wishes for sending to the Bell company for billing purposes and receive full "A" settlements.

It is assumed that any Independent

or Bell company desiring to accept this plan of settlement for aircraft flash messages will so notify the other company and establish a mutually agreeable date on which it will be made effective.

* * *

Aircraft Flash Messages
A Plan for Settlement

Nature of the Service

Aircraft Flash calls are a special type of communication service requested by the Air Force as a part of its air warning system.

The Air Force has requested that billing for Aircraft Flash messages be consolidated and billed by the Bell company in each of 70 Filter Center locations. This Air Force requirement results in the handling of Aircraft Flash calls on a special basis. For industry settlement purposes these calls are considered as sent-collect calls, in their general character, very similar to special reverse charge calls.

Nature of Participation

Aircraft Flash calls may be originated by an observer in an Independent company exchange and the Independent company may ticket and time such messages. In accordance with Air Force requirements, Aircraft Flash calls originated in an Independent company exchange and terminated in a Bell operated Filter Center, whether or not ticketed by the Independent, are included in a single bill to the Filter Center and collected by the Bell company.

Settlement

(1) Where the Aircraft Flash call is originated in Independent company territory and ticketed, timed and completed by a Bell office, the message is included in the regular toll settlement as a sent-collect message. This would result in the Independent company receiving half the schedule "A" settlement for each Flash message—for the ARPM, in the exchange, of all originated (SP+RC) messages.

(Note: Under this arrangement, the Independent company does not handle the Flash tickets in its traffic, commercial or accounting offices. All billing and collecting will be handled by the Bell company.)

(2) Where the Aircraft Flash call is originated in Independent company territory and the Independent company tickets, times and completes the call, the Independent company would receive —in addition to half the "A" commission described in the preceding paragraph—the full "B" commission for each Flash message—at the ARPM for "B" messages in that exchange. In this situation, Flash messages are included in the determination of the "B" ARPM for the exchange.

(Note: Under this arrangement, the Independent company will handle the Flash tickets in its traffic department ("B" function) and will then send these tickets to the Bell accounting center for billing and collecting the same as for collect calls; third number calls, credit card calls, etc.)

(3) Where an Aircraft Flash call is originated in Independent company territory and the Independent company tickets, times and completes the call and where these tickets are specially

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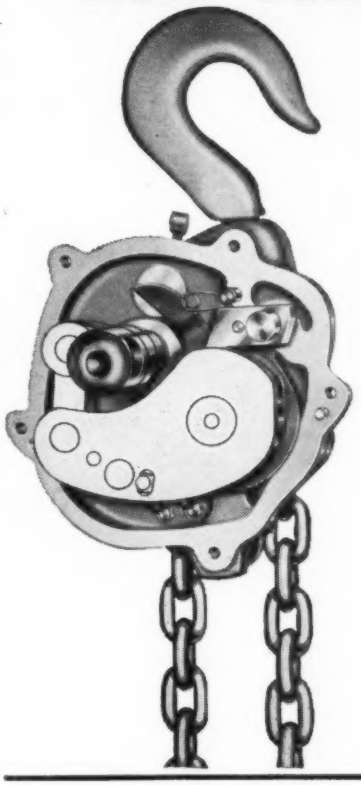

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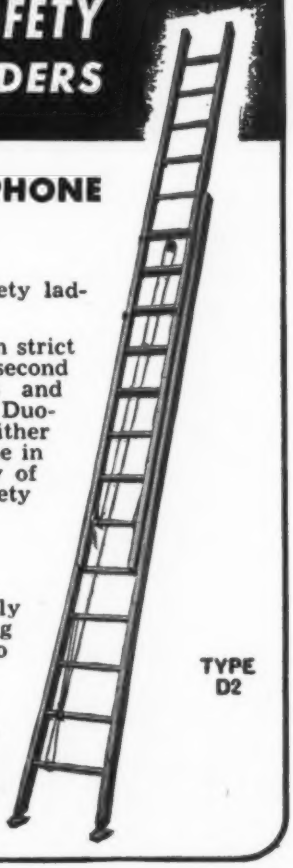

... CUSTOM DESIGNED FOR TELEPHONE MAINTENANCE WORK!

Here's one fine example of the many Duo-Safety ladders ideal for telephone maintenance work.

Type D — a truly great extension ladder built in strict accordance with safety regulations. Rungs are second growth hickory, reinforced with steel rods and equipped with special automatic locks and Duo-Safety's famous Safety Shoes. Made with either straight or parallel side rails, Type D is available in one, two or three sections — in a large variety of sizes. Write for free catalog on all Duo-Safety ladders.

IMMEDIATE DELIVERIES!

Duo-Safety ladders will be shipped immediately upon receipt of order! A planned stock-piling program assures really fast action — there's no delay the Duo-Safety way!

For Information, Contact Your Supply House, or

DUO-SAFETY LADDER CORP.
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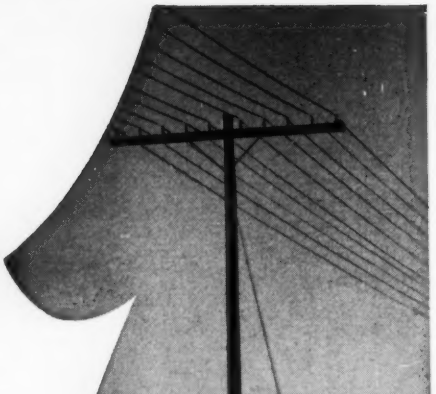

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HTL-135
INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA U.S.A.

LOWER
Cost Per Mile

● Efficient rural telephone circuits can be built at minimum overall cost where Crapo HTL-135 High-Tensile Line Wire is used to full advantage. For Crapo HTL-135 makes possible spans up to 350 feet in heavy, 540 feet in medium and 650 feet in light loading districts. Longer spans mean fewer pole structures with substantial savings in material and labor costs per mile.

The rugged tensile strength of Crapo HTL-135 and its heavy galvanized coating provide dependable and economical service life on typical rural lines.

Ask your jobber for details or write direct for engineering data!

INDIANA
STEEL & WIRE COMPANY
Muncie, Indiana

handled and a toll statement prepared by the Independent company, the "B" schedule will apply as in (2) above and the messages will be treated as sent-paid for the "A" function settlement, i.e., the full "A" schedule would apply.

(Note: Under this arrangement, the Independent company will handle the Flash tickets ("B" function); it will then assemble these tickets and prepare a toll statement (bill) which will be sent to the Bell accounting center which bills the Air Force, for inclusion with the consolidated bill covering Aircraft Flash messages.)

THE OPERATOR'S CORNER

Concluded from page 37

(2) Is it permissible to abbreviate central office names on Credit Card Calls?

(3) In recording an Outward call, on an address name call, should you ask, "Do you know the number?"

(4) How should a Dial Assistance Operator proceed in verifying a "don't answer" condition?

(5) How are Aircraft Flash calls charged for and billed?

Answers are presented on page 53

Unlisted Telephones Raise Pharmacy's Prescriptions

Prescription volume climbed 15 per cent within a few months after an unlisted telephone for use by physicians and dentists was installed and a promotional program for prescription services was launched, reports owner Vince Tassone of Vince's Pharmacy and the Depot Store in Ogden, Utah.

The unlisted telephones, he said, began paying for themselves "almost immediately. The doctors started using the numbers as soon as they received notice of them, and the increase in prescription volume was immediately noticeable."

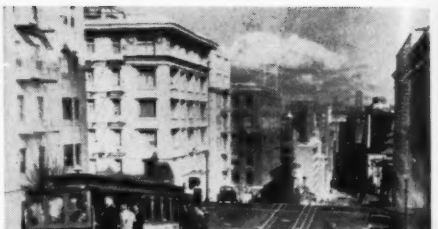
Complementing the promotion to physicians and dentists is a program of newspaper and direct mail advertising to the lay public.

Mr. Tassone says these advertising efforts have been followed up within the pharmacy by arranging prominent displays of sickroom needs, vitamins, and baby needs.

Illinois Bell Distributes Grants to 35 Institutions

Illinois Bell Telephone Co. on June 11 announced distribution of grants in aid totalling $65,750 to 35 privately-supported colleges and universities in Illinois for 1957. The total in 1956 was about $61,000.

Three additional schools received grants this year. They are Shimer Col-



An 8-tier run of Soapstone OCT-O-DUCT provides a new telephone link down hard-rock Nob Hill to colorful Chinatown in San Francisco.

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SAVE YOU MONEY

1 Trenchside delivery of Soapstone OCT-O-DUCT eliminates field inventory problems and makes certain your duct is at your job when you need it.

2 OCT-O-DUCT's convenient 4-foot lengths can be quickly installed by 2-men crews even in narrow and deep trenches.

3 OCT-O-DUCT's exclusive, flat-sided design eliminates the need for expensive interlayer spacers. Duct will not roll.

4 OCT-O-DUCT is connected in the trench with easy-to-apply circular couplings making possible fast, rhythmic, production-line installation.

The many time- and work-saving features of Soapstone OCT-O-DUCT and full information on the sizes, bends and accessories available from this 30-year-old Company are contained in our Catalog and Installation Manual. For your FREE copies, drop us a note on your letterhead.

SOAPSTONE DUCT COMPANY
3985 Beach Street, Oakland 8, California

Distributed in the West by
MAYDWELL & HARTZELL, INC.
SAN FRANCISCO, LOS ANGELES, SAN DIEGO,
PHOENIX, PORTLAND, SEATTLE, SPOKANE

lege in Mount Carroll, North Park College in Chicago and Eureka College in Eureka. Shimer and North Park, now junior colleges, are changing to four-year curricula. The grant to Eureka is to help it become accredited by the North Central Association.

"Other reasons for increasing the 1957 grants were the growth in enrollment in most schools and the fact that the number of graduates of these schools employed by Illinois Bell has increased," an Illinois Bell spokesman said.

Other Chicago schools receiving grants: DePaul University, George Williams College, Illinois Institute of Technology, Loyola University, Mundelein College, Roosevelt University, St. Xavier College and the University of Chicago.

Others: Augustana College, Aurora College, Barat College, Elmhurst College, Greenville College, Illinois College, Illinois Wesleyan University, Knox College, Lake Forest College, MacMurray College, Millikin University, Monmouth College, National College of Education, North Central College, Northwestern University, Olivet Nazarene College, Quincy College, Rockford College, Rosary College, College of St. Francis and Wheaton College.

Karachi and Mecca Linked

Direct radio-telephone service between Karachi, Pakistan, and Mecca, Saudi Arabia, was established recently.

Elements of Life

"Think nought a trifle, though it small appear;
"Small sands the mountain, moments make the year."

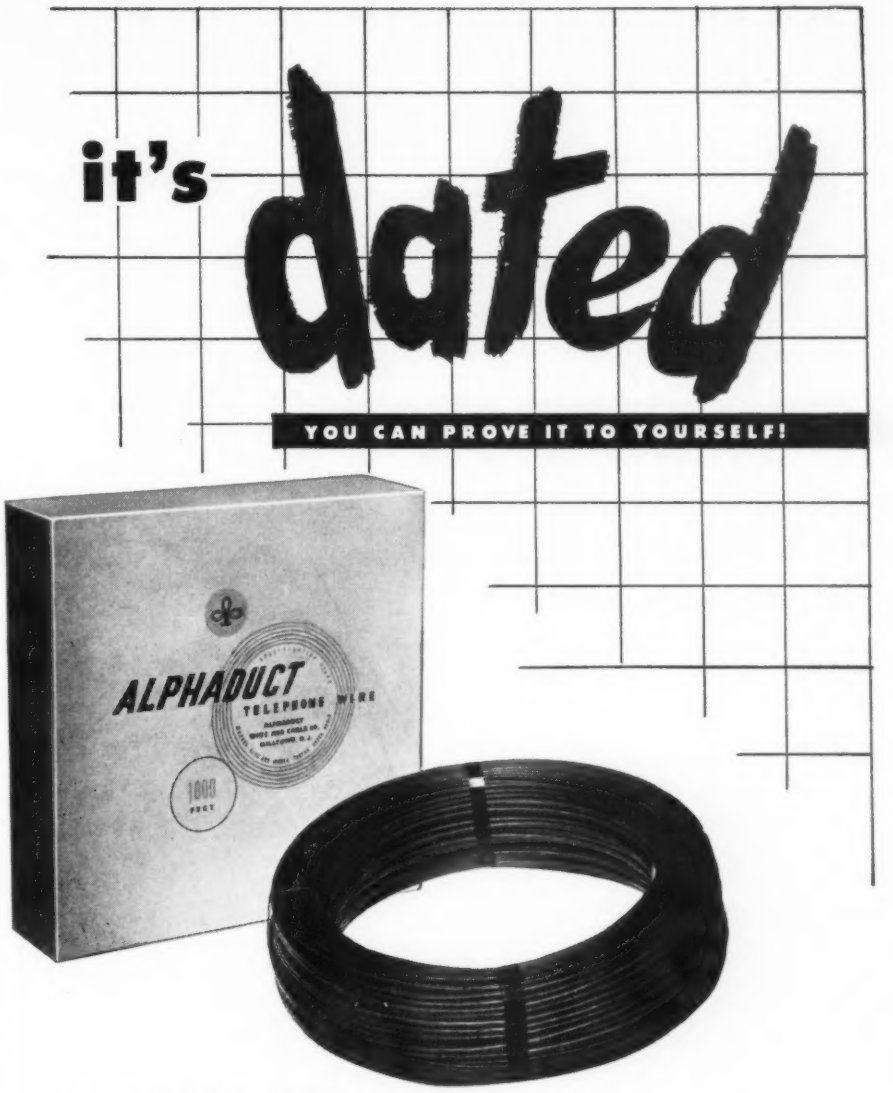
—YOUNG

Answers to Questions On Page 37

(1) Yes.
(2) Yes.
(3) Yes.

(4) If the line is OK, try to reach the called telephone in the regular way. After you have rung for a minute, if the called telephone has not answered, give the DA report and say, "Will you place your call again please?" and proceed as directed.

(5) Aircraft Flash calls are charged for and billed to either the regular Filter Center or to the alternate Filter Center, depending on the one to which the call is actually completed.



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Made of highest quality dry-process electrical porcelain . . . Porcelain Products' telephone insulators assure long, continuous service . . . customer satisfaction. Porcelain Products, Inc. has served the telephone industry for decades, offering a complete line of insulators that meet AT & T and REA specifications . . . simplifying installation . . . reducing maintenance. Write for complete information, today!

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FTL Appoints C. A. Hayne Systems Consultant

The appointment of Charles A. Hayne as systems development consultant for the wire communication laboratory of Federal Telecommunication Laboratories, Nutley, N. J., was announced by President Henri Busignies. FTL is the American research

C. A. HAYNE

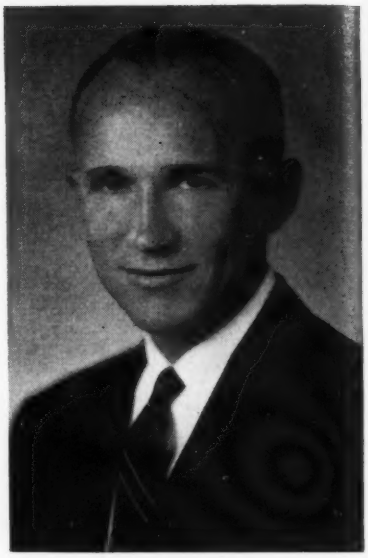
division of International Telephone & Telegraph Corp. His activities will include the sales promotion of system development projects.

Mr. Hayne was formerly industrial sales manager for telephone products for Federal Telephone & Radio Co., Clifton, N. J., another IT&T division.

Mr. Hayne was associated with the New York Telephone Co. for 16 years in various plant, commercial, and engineering capacities. In 1935 he engaged in his own business as a consulting communications engineer, and in 1944 joined the International Standard Electric Corp., an IT&T subsidiary, as a communications sales engineer. His activities included project engineering and the sale of a wide range of telecommunication systems and equipment for foreign countries. He later joined the telephone operating department of IT&T as a telephone equipment engineer, and in 1948 transferred to Federal Telephone & Radio, where he served as assistant and later divisional telephone sales manager, chief telephone project engineer, and industrial sales manager for telephone products.

Harold M. Cragg Appointed Gould District Manager

The appointment of Harold M. Cragg as the St. Paul district manager of the industrial division has been announced by Gould-National Batteries, Inc., Trenton, N. J. Mr. Cragg will supervise sales and service in Minnesota, Iowa and South Dakota from the district office at 1728 Roblyn Ave., St. Paul, Minn.



H. M. CRAGG

A Marine Corps veteran, Mr. Cragg joined the Gould organization in 1950 and has served as a specifications engineer prior to his appointment as district manager.

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the BN Booth

attracts revenue with its colorful, clean appearance... retains profits with sturdy maintenance-free construction.

Consult your distributor or write direct for folder... Benner-Nawman, Inc., 3421 Hollis Street, Oakland 8, California.

a B-N booth is a busy booth!

Prodelin Appoints Lakin Technical Service Engineer

Prodelin, Inc., Kearny, N. J., manufacturer of parabolic antennas and transmission lines, has appointed George A. Lakin to their technical service engineering staff.

Mr. Lakin was born in Philadelphia and received his B.S. degree from Muhlenberg College in 1949. He goes to Prodelin after five years of service with the U. S. Air Force.

While in the service Mr. Lakin served as commander of a radar detachment in the Far East; communications and electronics staff officer to a Tactical Air Force Wing, and staff project officer to the Directorate of Intelligence & Electronic Warfare, Rome Air Development Center, Rome, N. Y.

In his capacity as technical service engineer at Prodelin, Mr. Lakin will provide technical liaison between military and commercial users of Prodelin equipments and their engineering staff.

C & D Batteries Announces Management Appointments

C & D Batteries, Inc., of Conshohocken, Pa., announces the following management appointments:

Louis M. Eble Jr. was elected vice president at a recent directors meeting. In addition to vice presidential duties,

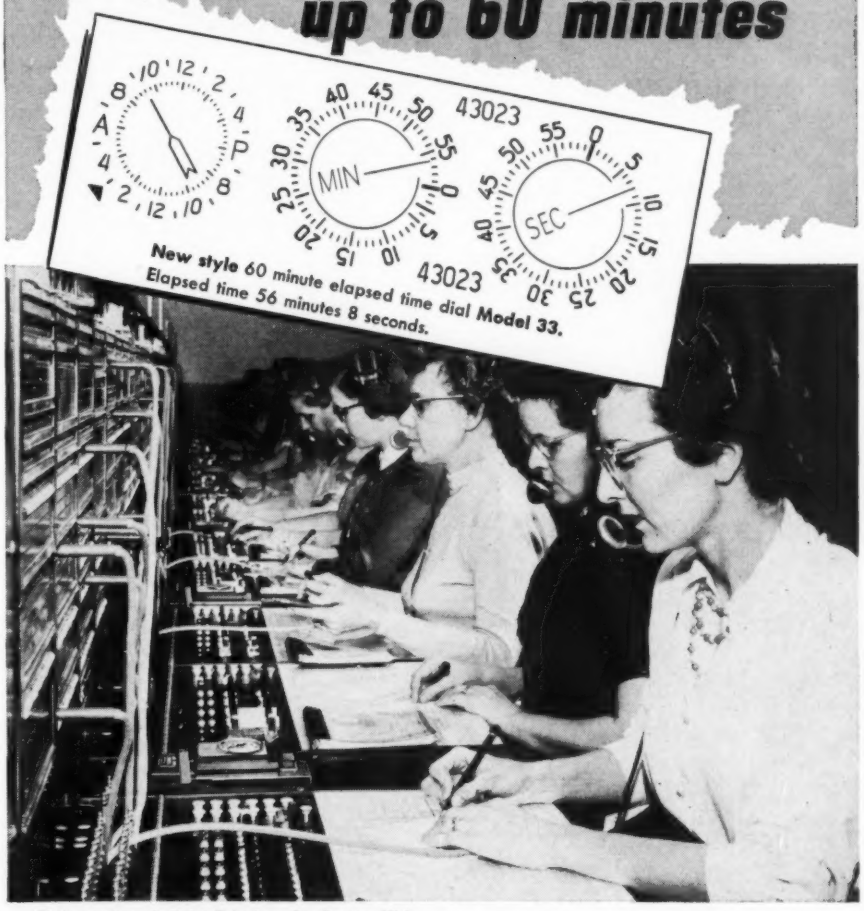
L. M. EBLE JR.

Mr. Eble will continue to direct purchasing, and advertising and sales promotion activities for the battery company.

After serving as an Air Force flight instructor, Mr. Eble graduated from the Pennsylvania State College in 1948 with a degree in industrial engineering. He joined Link Belt Co. and worked in Philadelphia on its plant layout, supervisor training, and material handling.

CALCULAGRAPH

Now Automatically gives you accurate Toll Call Records— up to 60 minutes



New style 60 minute elapsed time dial Model 33.
Elapsed time 56 minutes 8 seconds.

Photo courtesy of Union Telephone Co., Owosso, Mich.

Now, Calculagraph, the modern dependable computer, automatically figures and prints toll calls up to 60 minutes —no need to add 30 minutes on long conversations.

Thus, Calculagraph adds one more feature to reduce human errors by busy operators and increases the volume of calls handled per operator. Assures you of all revenue due on every call.

For accurate toll call records, for automatic computation of elapsed time, for more efficient operation, install the new 60-minute elapsed time Calculagraph on your switchboard.

Information on this new Calculagraph is yours upon request.

Write today for illustrated brochure to Dept. T.

CALCULAGRAPH Company
HARRISON, N.J.

DEPENDABLE ELAPSED TIME COMPUTERS SINCE 1892

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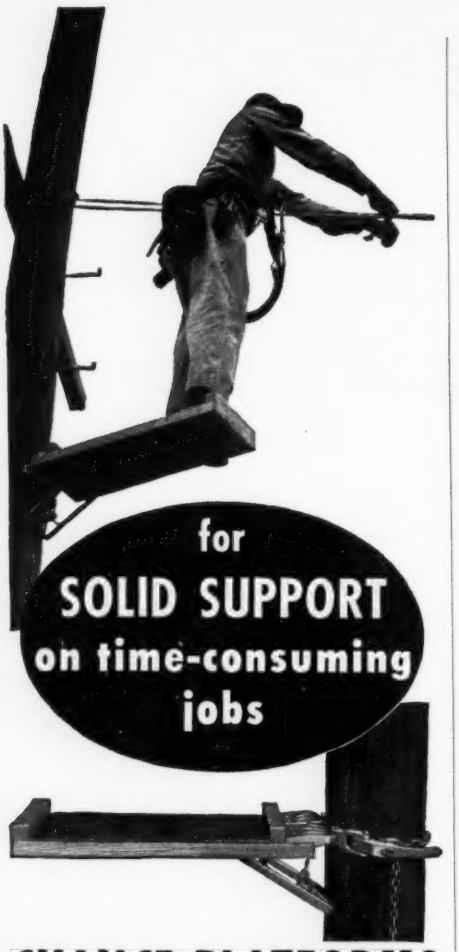

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reduce fatigue...
make work areas
more accessible

Here's the platform that puts your linemen at ease high above the ground because it is the strongest, safest, sturdiest platform available anywhere. It makes work, away from the pole, more accessible and reduces lineman fatigue on prolonged jobs.

Has these Saftey Features:

Safety Locking Chain Tightener—attaches quickly and easily . . . locks securely so that platform can't be loosened accidentally.
Grip-Tread Surface—platform is topped with Goodyear Grip-Tread for a safe, sure footing.
Superior Strength—platforms are made from carefully selected Douglas Fir boards . . . each board is individually tested before shipment.
End Cleats for Added Safety—end cleats show lineman his position on the platform.

The Chance Utility Platform, a 30-inch lightweight platform tested for 750 pounds, is ideal for telephone line splicing or similar time consuming jobs. Longer, adjustable or pivot platforms are also available from your Chance Distributor.

CT55-14

ABC INDUSTRIES

A·B·CHANCE CO·
CENTRALIA, MISSOURI
San Francisco, California

In 1949, Mr. Eble joined C & D Batteries as advertising manager and assistant to the vice president in charge of sales. He was elected a director in 1953.

Mr. Eble is a member of the American Materials Handling Society, National Industrial Advertisers Association, and the National Association of Purchasing Agents.

Stewart E. Doughty, formerly quality control supervisor and a company director, was elected treasurer by the directors.

Stewart E. Doughty, son of the former president, Leon A. Doughty,

S. E. DOUGHTY

who succumbed to a heart attack on May 18, succeeds Frank S. Carlile, who was elected to the newly-created post of chairman of the board. Mr. Carlile and the elder Doughty founded the company, which manufactures industrial storage batteries, back in 1906.

The new C & D treasurer attended Temple University and the Drexel Institute of Technology. Prior to his wartime service with the Air Force, Mr. Doughty was employed by the Pioneer instrument division, Bendix Aviation Industries, in the inspection and quality control sections.

Following World War II, he joined C & D as chief inspector, and in 1952 became quality control supervisor.

H. Russell Stewart, assistant to the secretary and vice president of marketing, has been named a director, it has been announced by Mr. Carlile.

Mr. Stewart joined the company, manufacturers of industrial storage batteries, as a junior accountant in 1949. He was made assistant secretary in December 1952 and became assistant to the vice president of marketing in April of this year.

Before joining C & D, Mr. Stewart

H. R. STEWART

had been employed by the Insurance Co. of North America.

Mr. Stewart attended the Navy V-5 program. An accounting major, he was graduated from Lehigh University in February 1949 with a bachelor's degree in business administration.

He also studied at the Wharton School of the University of Pennsylvania, earning his master's degree in business administration in 1955 as an industrial management major.

Electronic Secretary Builds Wisconsin Plant

George W. Danner, president, Electronic Secretary Industries, Inc., Milwaukee, Wis., has announced that the new plant being constructed by the

G. W. DANNER

company at Waukesha, Wis. will be ready for manufacturing operations by July 1.

The firm, a part of the manufacturing, sales and research division of the General Telephone System, produces

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Aluminum alloy housing reduces weight 21 pounds . . . full 10 ton lifting capacity maintained!

The new Simplex A1029 Reel Jack increases your men's efficiency by minimizing fatigue. Its lighter weight is a distinct advantage in loading, unloading and carrying to location, and its single-acting mechanism provides much easier lifting. Capacity 10 tons; weight 83 lbs. For reels up to 84" dia. Supplied with sturdy, laminated oak "T" base and 5' lever bar. Write today for full information.

Other SIMPLEX lightweight Leaders
A1538—Aluminum Pole Pulling & Straightening Jack; 15 tons cap., weight 63 lbs.
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The proved and standard protection for Underground Telephone Cables. Highest quality and full line of shapes.

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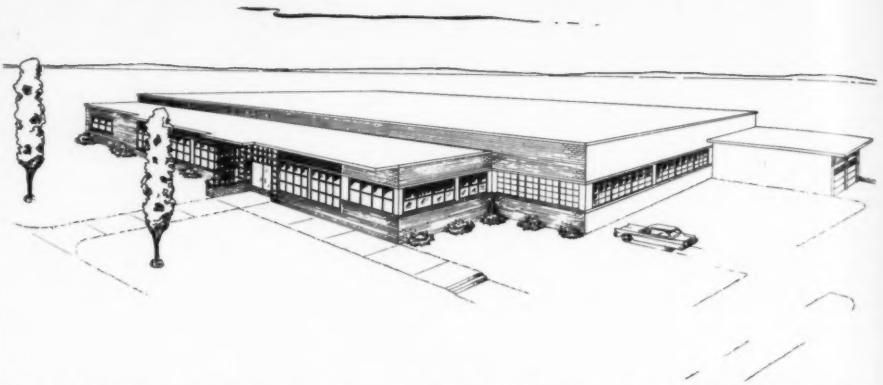

Artist's sketch of Electronic Secretary Industries, Inc. plant at Waukesha, Wis.

automatic telephone answering and voice recorder equipment.

Final completion of the modern 24,000-square-foot factory is scheduled for late August. All activities now being carried on at the Milwaukee plant will be transferred to the new facility. Production is expected to increase by 125 per cent, the company stated.

The Electronic Secretary was invented by Joseph J. Zimmermann in 1948. He became acquainted with Mr. Danner, then a partner in an instrument company, and the two teamed up to form the present company, with Danner becoming president and Zimmermann vice president.

The first commercial Electronic Secretary was built and sold in 1949. Demand increased and in 1953, Leich Sales Corp. became the company's distributor.

Approximately 7500 units are now in use, both in Independent and Bell System areas. The company has developed a pocket-sized portable oscillator unit that enables a user to call the Electronic Secretary from any telephone and hear the play-back.

Mr. Danner attended Elgin, Ill. high school and Purdue University, and then worked for the Milwaukee Gas & Light Co. and the Kolmar Laboratories before becoming a partner and sales engineer for the Wisconsin Instrument & Control Co.

Mr. Zimmermann is a native of Milwaukee. He received his engineering education at Marquette University and took graduate work in electronics at Ohio State University.

After one year with Western Electric Co., he went into the ventilation, air conditioning and temperature control business, and remained in this field, with time off to serve in the Army Signal Corps during World War II, until he and Danner organized Electronic Secretary Industries, Inc.

Early in 1957, the stock of Electronic Secretary Industries was acquired by the General Telephone Corp.

Automatic Electric begins a mammoth move to its new factory and technical center at Northlake, Ill. H. F. Lello (left), executive vice president of the company, shakes hands with Richard Joyce, president of Joyce Brothers Storage & Van Co., behind giant telephone model which symbolizes the move, largest ever undertaken in the Midwest. The operation will involve more than 2,000 van loads of furnishings and equipment, plus an estimated 2,600,000 pounds of machinery. It will be completed in about 100 days, without interruption of production.

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Pace Named President of NATO Group

Frank Pace Jr., president of General Dynamics Corp., has been elected board chairman and president of the American Council on NATO, Inc. He succeeds Robert B. Anderson, deputy secretary of defense, who was recently named by President Eisenhower as Secretary of the Treasury.

Pace, Secretary of the Army during the Korean conflict and a former Director of the Budget, has been vice chairman and vice president of the NATO group since 1955.

The American Council on NATO, Inc., is a private non-profit organization founded in 1953 for the purpose of stimulating public interest in and constructive study of the North Atlantic Treaty Organization and the problems of the Atlantic community.

A E International Shifts Latin American Executives

C. S. Cadwell, president, Automatic Electric International, has announced a series of executive changes in the company's Latin American organization.

James B. Behling, formerly export district manager in Chicago for the Central American and Caribbean area, has been named vice president and general manager of Automatic Electric de Mexico, S. A. in Mexico City. This office will be responsible for field coverage of all Central American countries. Automatic Electric de Mexico, S. A. will continue to be associated with the firm of Henry S. Dabdoub, S. A. agents for Automatic Electric and Lenkurt Electric products in Mexico.

Mr. Behling succeeds Luis Pitigliani who becomes vice president and general manager of Automatic Electric do Brasil, S. A. at Sao Paulo, headquarters for Automatic's sales and engineering activities in Brazil, Argentina, Uruguay, Paraguay, Chile and Bolivia.

D. C. Clegg, who has been in charge of the Brazilian affiliate, will return to the United States for several months at Automatic Electric's offices in Chicago, before undertaking his next assignment abroad.

All are veterans of Automatic's international operations. Mr. Clegg, who joined the company in 1937, has served in Central and South America for the past 10 years. Mr. Pitigliani, who has had wide experience in both Europe and Latin America, has been with the Automatic Electric International group since 1939. Mr. Behling has served in the organization's New York and Chicago headquarters in engineering and administrative capacities since joining the group in 1950.

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TELEPHONE ELECTRONICS INSTALLATION CORP.
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DESIGN—SURVEYS—APPRAISALS—Construction and Maintenance of Overhead and Underground Telephone Plant. Complete supply of poles available for emergency requirements.
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PUBLIC UTILITY CONSTRUCTION
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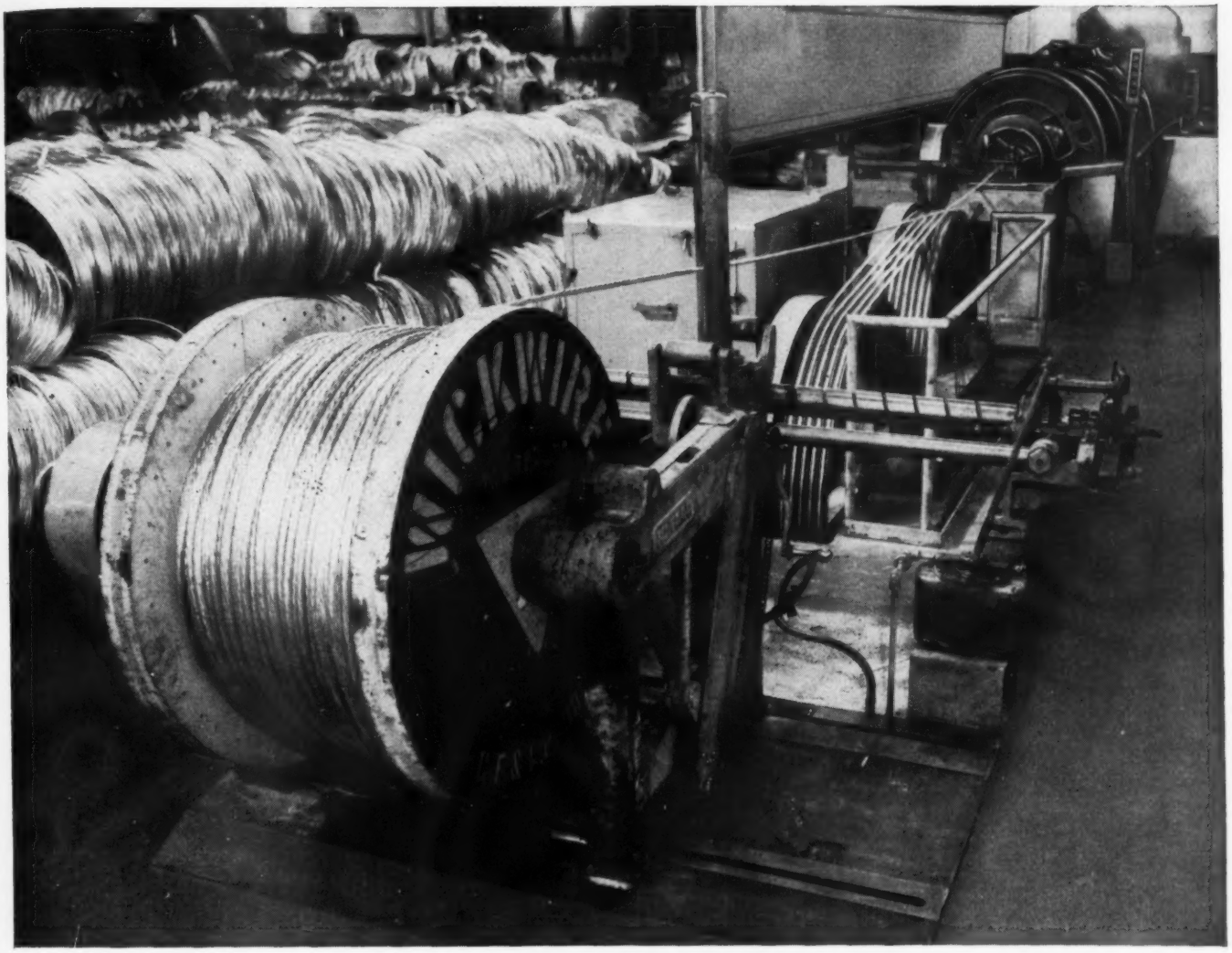

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